U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 1

AMENDED RECORD OF DECISION

OTTATI AND GOSS/GREAT LAKES CONTAINER CORPORATION SUPERFUND SITE KINGSTON, NEW HAMPSHIRE

SEPTEMBER 2007

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PART 1

DECLARATION
FOR THE AMENDED RECORD OF DECISION

I. SITE NAME AND LOCATION

Ottati and Goss/Great Lakes Container Corporation Superfund Site
Haverhill Road, Route 125
Kingston (Rockingham County), New Hampshire
CERCLIS ID# NHD990717647
Site ID# 0101210
NPL Final 9/8/83

II. STATEMENT OF BASIS AND PURPOSE

This decision document presents the amended remedial action for the Ottati and Goss/Great Lakes Container Corporation Superfund Site (the "Site"), in Kingston, New Hampshire, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 USC Part 9601 *et seq.*, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300. The original approved remedial action for the Site was documented in a Record of Decision (ROD) signed in January 1987. The Director of the Office of Site Remediation and Restoration (OSRR), United States Environmental Protection Agency, Region 1, has been delegated the authority to approve this Amended Record of Decision (Amended ROD).

This decision was based on the Administrative Record, which has been developed in accordance with Section 113(k) of CERCLA, and which is available for review at the Kingston Town Hall, Kingston, NH, (electronic format only) and the United States Environmental Protection Agency, Region 1, Records Center in Boston, Massachusetts. The Administrative Record Index (Appendix E to this Amended ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

The State of New Hampshire concurs with the selected amended remedy (see Appendix C to this Amended ROD).

III. RATIONALE FOR AMENDMENT

In January 1987, EPA issued a Record of Decision for the Site which included a groundwater extraction and treatment system. Based on information and data generated since the issuance of the 1987 ROD and after the careful study of alternative groundwater cleanup technologies, the EPA believes that *in-situ* chemical oxidation (ISCO) is a better approach to cleaning the groundwater at the Site than the groundwater extraction and treatment system selected in the 1987 ROD. The information and data which supports a fundamental change to the groundwater component of the 1987 ROD is summarized in the Amended ROD (Part 2, Section III).

IV. ASSESSMENT OF THE SITE

The response action selected in this Amended ROD is necessary to protect the public health and the environment from actual or threatened releases of hazardous substances into the environment.

V. DESCRIPTION OF THE SELECTED AMENDED REMEDY

The cleanup alternative selected in the 1987 ROD consisted of:

- Excavating approximately 19,000 cubic yards of soil to be treated on Site using incineration and thermal aeration;
- Mitigation of groundwater contamination by extraction, treatment, and re-injection of the treated groundwater;
- Demolition and disposal of above-ground and below-ground structures including a building, utilities, and underground storage tanks;
- A soil cover;
- Long-term monitoring of the Site.

All of the cleanup activities required by the 1987 ROD and subsequent decision documents have been completed with the exception of the extraction and treatment of contaminated groundwater. As stated above, the EPA believes that *in-situ* chemical oxidation (ISCO) is a better approach to cleaning the groundwater at the Site than the groundwater extraction and treatment system selected in the 1987 ROD. The amended groundwater remedy is comprised of the following:

- Injecting an oxidizing agent directly into the groundwater to destroy or reduce the organic contaminants to safe levels.

- Installing monitoring wells at the Site and on portions of abutting properties to evaluate the progress of the groundwater cleanup.

- Placing restrictions on land and groundwater use at the Site and on portions of abutting properties until the contaminants in the groundwater have been destroyed or reduced to safe levels.

VI. STATUTORY DETERMINATIONS

The amended remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

The amended remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduce the toxicity, mobility, or volume of materials comprising the principal threat through treatment).

Since the installation and operation of the groundwater monitoring and injection wells required as part of the amended remedy may alter federally-regulated wetland resources, EPA has made the finding under Section 404 of the Clean Water Act, 33 U.S.C., Part 1344, that the amended remedy is the least damaging practicable alternative to address groundwater contamination while protecting wetland resources. Public comment was solicited regarding this finding in the Proposed Plan and no comments in opposition to the finding were received.

Because this amended remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, institutional controls are necessary until the groundwater has been completely restored to the cleanup goals. As required by CERCLA, reviews of the Site will continue to be conducted at least every five years to ensure that the amended remedy continues to provide adequate protection of human health and the environment. The next review (fourth five-year-review) will be performed in 2008.

VII. DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this Amended ROD. Additional information can be found in the Administrative Record file for this Site.

1. Chemicals of concern (COCs) and their respective concentrations. ✓

2. Identification of principal and low-level threats. ✓

3. Baseline risks represented by the COCs. ✓(discussed in the 1987 ROD, with additional COCs identified in the Amended ROD)

4. Cleanup levels established for COCs and the basis for the levels. ✓

5. Current and future land and groundwater use assumptions used in the baseline risk assessment and ROD. ✓(discussed in the 1987 ROD, and the 1999 Explanation of Significant Differences (ESD))

6. Reasonably anticipated land and groundwater uses that will be available at the Site as a result of the amended remedy. ✓(same as those discussed in the 1987 ROD and the 1999 ESD)

7. Estimated capitol, operation and maintenance, and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected. ✓

8. Decisive factor(s) that led to selecting the amended groundwater remedy including potential human health risks, the designation of the aquifer which underlies the Site as a "high value" and the reasonably anticipated future use of the Site. ✓(discussed in the 1987 ROD, and the 1999 ESD)

VIII. AUTHORIZING SIGNATURES

This Amended ROD documents the selected remedy for groundwater at the Site. This amended remedy was selected by the EPA with concurrence of the State of New Hampshire Department of Environmental Services.

9.26.07
Date

James T. Owens, III, Director
Office of Site Remediation and Restoration
EPA – New England

Part 2

AMENDED RECORD OF DECISION

OTTATI AND GOSS/GREAT LAKES CONTAINER CORPORATION SUPERFUND SITE

SEPTEMBER, 2007

I. SITE NAME, LOCATION AND BRIEF DESCRIPTION

SITE NAME: Ottati and Goss/Great Lakes Container Corporation Superfund Site (the Site). CERCLIS ID# NHD990717647. EPA Fund-lead.

SITE LOCATION: The Site is located in Rockingham County, in the town of Kingston New Hampshire (see Figure 1).

SITE DESCRIPTION: The approximately 58-acre Site is divided by Route 125 and is comprised of three distinct sections. The first section is a 5.89-acre parcel, historically referred to as the Great Lakes Container Corporation and Kingston Steel Drum (GLCC/KSD) area. This portion of the Site is fenced and is now owned by the State of New Hampshire. The second section is 29 acres; owned partly by the Senter Transportation Company (BBS Realty Trust; parcel north of the State-owned parcel), and partly by Concord Realty Trust or John Peter Sebetes (south of the State-owned parcel). One acre of this 29-acre section was leased to Ottati and Goss, Inc. (O&G). This entire 29-acre parcel is at times referred to as the O&G portion of the Site. The third section is a 23-acre marsh located east of the GLCC/KSD section, between Route 125 and Country Pond. This parcel was purchased by the IMCERA Group, Inc. in 1984 and is referred to as Country Pond Marsh (see Figure 2).

II. SITE HISTORY, SUMMARY OF SITE CONTAMINATION, DESCRIPTION OF THE 1987 SELECTED REMEDY, AND SUMMARY OF REMANING SITE RISKS

SITE HISTORY: From the late 1950's through 1967, the Conway Barrel and Drum Company (CBD) owned the Site and performed drum reconditioning operations in the GLCC/KSD portion of the Site that is now owned by the State of New Hampshire. The reconditioning operations included caustic rinsing of drums and disposal of the rinse water in a dry well near South Brook. As a result of South Brook and Country Pond

pollution, CBD established two leaching pits (lagoons) in areas removed from South Brook. These lagoon areas were known as the "Kingston Swamp" and the "caustic lagoon." Kingston Steel Drum, the operator of the facility from 1967 to 1973, continued the same operations as CBD.

In 1973, International Minerals and Chemicals Corporation (IMC) purchased the drum and reconditioning plant and operated it until 1976. The lagoons were reported to be filled in 1973 and 1974. The property was purchased in 1976 by the GLCC. Beginning in 1978, O&G leased a small part of the Site and conducted operations that were described as "processed hazardous materials brought to the Site in drums." Heavy sludges from the wash tank and from drainings, and residues from incinerator operations at GLCC were transported to the O&G portion of the Site for processing. O&G operations ceased in 1979. GLCC continued the drum reconditioning operation on its portion of the Site until July 1980.

A number of investigations and remedial activities have been conducted at the Site since 1980. From December 1980 to July 1982, EPA conducted emergency removal actions and processed and removed over 4,000 drums from the O&G portion of the Site. In September 1983, the Site was listed on the NPL. IMC conducted similar operations at the GLCC/KSD portion of the Site, removing drums and soil between July 1984 and June 1985. The total removal included 12,800 tons of soil, drums, and metals; 101,700 tons of flammable sludge; and 6,000 gallons of flammable liquid.

SUMMARY OF SITE CONTAMINATION: Remedial Investigation/Feasibility Study (RI/FS) activities were completed under a Cooperative Agreement with the New Hampshire Water Supply and Pollution Control Commission in 1986. The RI/FS conclusions were as follows (GZA, 1986):

- Soil throughout the Site was contaminated with volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), acid/base/neutral compounds (ABNs), metals, and cyanide at high concentrations at numerous locations.
- Surface water in North Brook, South Brook, and Country Pond contained dissolved VOCs.
- Sediments in North Brook, South Brook, and the marsh contained VOCs and PCBs.
- Groundwater contaminated with VOCs, arsenic, nickel, iron and manganese was evident in several plumes. The plumes appeared to merge into one plume which migrated under Route 125 and Country Pond Marsh, eventually discharging into Country Pond.
- There were no significant airborne contaminants.

DESCRIPTION OF THE 1987 SELECTED REMEDY: In January 1987, EPA issued a Record of Decision for the entire Site which summarized the evaluation of remedial alternatives presented in the 1986 Feasibility Study (FS). The cleanup alternative selected in the ROD generally consisted of: excavating approximately 19,000 cubic yards of soil and sediment to be treated on Site using incineration and thermal aeration; installation of a groundwater extraction, treatment, and discharge system for the treated groundwater; site grading, demolition/disposal of above-ground and below-ground structures including a building, utilities, and underground storage tanks; a soil cover; and long-term monitoring of the Site and Country Pond.

All of the cleanup activities required by the 1987 ROD have been completed with the exception of the groundwater extraction and treatment system. A more detailed description the post-1987 ROD remedy activities completed to date are discussed below.

1987 Remedy Activities Completed to Date: In 1988 and 1989, several potentially responsible parties (PRPs) excavated and treated approximately 4,700 cubic yards of VOC-contaminated soil at the former O&G area of the Site (see Figure 2). The treatment method used was thermal desorption (thermal aeration in the ROD). This work was designated as operable unit 1 (OU1). The groundwater treatment design, which was being performed by the PRPs, was designated as operable unit 2 (OU2).

In 1993, EPA, the New Hampshire Department of Environmental Services (NHDES), and the PRPs entered into a Consent Decree. This agreement resulted in most parties contributing to a cash settlement, rendering the remainder of the costs at the Site to be paid for by the Federal Superfund. Operable units 3 and 4 (OU3 and OU4) were subsequently designated to complete the remediation, with OU3 related to addressing the groundwater contamination and OU4 related to addressing building demolition and soil and sediment contamination. OU1 (the former O&G area) was considered completed and OU3 superseded OU2 (no groundwater treatment design was completed by the PRPs).

From September 1993 through February 1994, the large building which housed the drum reconditioning operations on the GLCC/KSD portion of the Site was demolished. Hazardous materials were removed from the building and disposed of off-site. Several underground storage tanks were also removed.

In September 1996, a preliminary design for the groundwater extraction and treatment system (OU 3) was completed.

In September 1999, an Explanation of Significant Differences (ESD) to the 1987 ROD was issued. The ESD addressed a change in the treatment technology to be used to remediate the contaminated soils and sediments. The ESD also restricted future use of the former GLCC/KSD property to commercial use (without day care) and addressed an increase in the amount of soil to be excavated and treated.

The NHDES acquired the former 5.89 acre GLCC/KSD property in the Fall of 2000. In 2000, EPA contracted the U.S. Army Corps of Engineers – New England District (USACE) to perform soil and sediment remediation at the Site. Environmental Chemical Corporation

(ECC) was contracted by USACE to complete the OU4 soil and sediment excavation, low temperature thermal desorption (LTTD) treatment, and restoration activities. Between August 2001 and June 2002, approximately 72,347 tons of PCB- and VOC-contaminated soil (not including oversized material > 2-inches) was excavated from the GLCC/KSD area of the Site and treated in an on-site LTTD plant (ECC, 2003).

Between February 2001 and October 2002, approximately 9,143 tons of sediment from Country Pond Marsh were excavated, transported, and disposed of as non-hazardous waste at a Resource Conservation and Recovery Act (RCRA) Subtitle D disposal facility. Approximately 492 tons of sediment were transported and disposed of as PCB hazardous waste (regulated under the Toxic Substances Control Act (TSCA)) at a RCRA Subtitle C landfill facility. The Country Pond Marsh remediation was divided into two areas, a thirty-inch deep excavation area, and a six-inch deep excavation area. Remediation and restoration of OU4, totaling six acres of wetland in Country Pond Marsh, was completed in September 2002.

Small portions of soil contamination with total VOC concentrations greater than the cleanup goal of 1 ppm (1,000 µg/kg) total VOC could not be excavated because it was not possible to dewater the excavation to reach all contaminated soil in the saturated zone. Also, some soil contamination was located very close to Route 125 and further excavation was not possible because of concerns with respect to undermining the road. The quantity of such soil was judged to be relatively small in comparison to the quantities that were successfully excavated, treated, and backfilled. Therefore, it was determined that any residual soil source areas would be managed under the groundwater operable unit (OU3).

In February 2002, an ESD was issued addressing a modification to the handling of residual materials. In March 2003, the Final Remedial Action Report for soil and sediment remediation on the GLCC/KSD and Country Pond Marsh portions of the Site was issued.

From November 2004 through February 2005, EPA completed a groundwater pump test, pilot scale groundwater treatability study and prepared a groundwater treatability study report. From October 2006 through June 2007 the EPA conducted additional groundwater and soil sampling on the GLCC/KSD portion of the Site to gain a better understanding of the horizontal and vertical extent of the primary sources of VOC contamination remaining at the Site and which continue to be on-going sources of groundwater contamination.

In July 2007 the State of New Hampshire recorded a notice to the chain of title for the GLCC/KSD property to document the land use restrictions required to maintain the protectiveness of the soil remedy and to establish institutional controls over 5.89 acres of the Site.

As stated in the above Section all of the cleanup activities required by the 1987 ROD and the two subsequent ESDs have been completed with the exception of the extraction and treatment of contaminated groundwater.

SUMMARY OF REMAINING SITE RISKS: The risks posed by the contaminated soils and sediments have been remediated by the cleanup activities described above. However, the contaminated groundwater still poses a future threat to public health if nothing is done to remediate the problem. Residential water supply wells in the vicinity of the Site currently show no Site related contamination. A more detailed discussion of the groundwater risks can be found in the 1987 ROD

III. BASIS FOR THE ROD AMENDMENT

In January 1987, EPA issued a Record of Decision for the Site. All of the cleanup activities required by the 1987 ROD were completed by 2000 with the exception of the groundwater extraction and treatment system. Based on information and data generated since the issuance of the 1987 ROD and after the careful study of alternative groundwater cleanup technologies, the EPA believes that *in-situ* chemical oxidation (ISCO) is a better approach to cleaning the groundwater at the Site than the groundwater extraction and treatment system selected in the 1987 ROD (original remedy). The following summarizes the information and data which supports a fundamental change to the groundwater component of the 1987 ROD:

- In March 2004, M&E conducted groundwater monitoring for the EPA (M&E, 2005a) to obtain data following completion of the OU1 and OU4 components of the overall remedy for the Site. The groundwater data was also used in development of a pilot-scale ex-situ treatability study and pumping test to be performed later that year. The 2004 data indicated several trends in the residual groundwater contamination at the Site, including a significant reduction in the extent of groundwater contamination and the identification of three distinct high concentration areas. The first area is centered on the State-owned portion of the Site in the vicinity of monitoring well GZ-11 (Area A). The second source area is in the southeast corner of the State-owned portion of the Site, along the fence that borders Route 125, in the vicinity of monitoring wells ME-4 and MEOW-3 (Area B). The third source area, located north of the State-owned portion of the Site is on the BBS Realty Trust parcel (the Northern Plume). Refer to Figure 3 for the locations of the three high groundwater concentration areas.

- Due to the high dissolved iron concentrations in the Site's groundwater, metals precipitation would be necessary to ensure the effective operation of the advanced oxidation treatment unit required for the groundwater extraction and treatment system (M&E, 2007a). This metals precipitation step would have high capital and operation and maintenance costs, including costs for operators to go to the Site routinely to process metals sludge, as well as costs for off-site disposal of the sludge. The operation and maintenance cost estimates were driven by the cost of sludge disposal, which was based on the treatability study results (M&E, 2005a) and did not take into account that the sludge solids content could be increased significantly for a full-scale system employing a clarifier and sludge thickener.

- The time necessary to extract contaminated groundwater to achieve the target cleanup levels has been updated based on the information obtained during the 2004/2005 pump test and treatability study (M&E, 2005) and the 2007 vertical profiling effort (M&E, 2007a). It is now estimated that the groundwater extraction and treatment system would operate for a period of at least 10 years for Area A and the Northern Plume, and an additional 20 years for Area B (see Figure 3). Time of remediation estimates were made using the Natural Attenuation Software (NAS) model developed by the United States Geological Survey (M&E, 2007b). The amended remedy is expected to reach the groundwater target cleanup levels at the Route 125 Site boundary in approximately 5 years.

IV. DESCRIPTION OF FUNDAMENTAL CHANGES TO THE 1987 RECORD OF DECISION

DESCRIPTION OF THE 1987 REMEDY: In January 1987, EPA issued a Record of Decision for the entire Site which summarized the evaluation of remedial alternatives presented in the 1986 Feasibility Study (FS). The cleanup alternative generally selected in the ROD consisted of:

- Excavating approximately 19,000 cubic yards of soil and sediment to be treated on Site using incineration and thermal aeration;
- Mitigation of groundwater contamination by extraction, treatment, and discharge of the treated groundwater to up-gradient groundwater or possibly surface water;
- Site grading demolition/disposal of above-ground and below-ground structures including a building, utilities, and underground storage tanks;
- A soil cover; and
- Long-term monitoring of the Site and Country Pond.

All of the cleanup activities required by the 1987 ROD and subsequent decision documents have been completed with the exception of the extraction and treatment of contaminated groundwater. The following is a more detailed discussion of the groundwater extraction and treatment system selected in the 1987 ROD:

- Groundwater extraction wells were to be located within source areas, along the eastern boundary of the GLCC/KSD property (*i.e.*, along the western edge of Route 125), and within the marsh area downgradient of the source areas.
- The treated groundwater was to be discharged to upgradient groundwater and possibly surface water.

Groundwater extraction and treatment was specified to occur for a period of five years from the date of implementation. At that time, an evaluation of the technical feasibility of the remedy achieving target compound levels was to be conducted, if target levels had not been attained. Achievement of target levels was defined as the continuous detection of specified contaminants of concern at or below target concentrations for a period of three years at the Route 125 Site boundary and at selected on-site monitoring wells.

The groundwater extraction component of the remedy described in the 1987 ROD also included the following components:

- Monitoring on-site wetlands to ensure that groundwater extraction is not negatively impacting the wetlands (*e.g,.* lowering water levels within the wetland);

- Initiating a long-term groundwater monitoring program of on-site and off-site monitoring wells; and

- Monitoring residential wells during implementation of the remedy. The frequency and parameters of the monitoring was to be determined during design.

Remedial Action Objectives and Target Cleanup Levels: The remedial action objectives (RAOs) described in the 1987 ROD for groundwater are as follows:

- Minimize risks to human health associated with potential future consumption of and direct contact with groundwater;

- Minimize migration of contaminants in groundwater such that groundwater discharging to Country Pond is not harmful to human health or aquatic ecological systems;

- Meet or exceed all applicable or relevant federal public health or environmental standards, guidance, and advisories; and

- Minimize potential impacts of implementing the selected management of migration alternative on adjacent surface waters and wetlands.

The Target Cleanup Levels for Site groundwater presented in the 1987 ROD were based on attaining an incremental lifetime cancer risk range of 10^{-5} in Site groundwater, based on groundwater use as drinking water. The 1987 ROD selected four VOCs as "target compounds" or "indicator compounds" that would be used to evaluate progress towards meeting the remedial action objectives: 1,2-dichloroethane, trichloroethylene, tetrachloroethylene, and benzene. As target levels for the remediation, the 1987 ROD cited the Federal Maximum Contaminant Levels (MCLs) for each of the four indicator compounds. The MCL for each indicator compound was 5 ppb. The ROD presented the estimated risk level for the indicator compounds if all were present at a concentration of 5 ppb and the groundwater were used for drinking water, and that level was calculated to be 2.6×10^{-5}. The 1987 ROD also noted arsenic and nickel as contaminants of concern, but did not establish target levels for these constituents.

CHANGES TO THE 1987 REMEDY: The major components of EPA's new proposed cleanup plan include: *in-situ* chemical oxidation (ISCO); environmental monitoring and institutional controls. Each component is discussed below.

***In-Situ* Chemical Oxidation:** ISCO involves the injection of an oxidant directly into the groundwater to break down contaminants into non-hazardous by-products such as water, salt, and carbon dioxide. The goal for *in-situ* chemical oxidation is to achieve significant mass removal of contaminants, with the intent of eventually achieving Federal and State drinking water standards in the groundwater. ISCO would be used in the three areas (A, B, and North Plume) of the Site shown in Figure 3.

Several chemical oxidants are available for contaminant remediation, including: permanganate; persulfate; percarbonate; Fenton's Reagent and ozone. For this Site, an oxidant capable of oxidizing VOCs (including benzene, toluene, ethylbenzene, xylene and chlorinated ethenes), and 1,4-dioxane is required. Oxidants which have been demonstrated to oxidize these contaminants include ozone, Fenton's Reagent, and activated persulfate.

Oxidant delivery can be performed through semi-permanent wells, direct-push rods, or screened injection wells installed using a standard drill rig. Addition of an oxidant can also be conducted via soil blending using augers or excavator-mounted mixing equipment. Injection into permanent wells similar to standard groundwater monitoring wells is a readily implementable and commonly applied method. This method would allow for additional future injections with less drilling activity and allow additional data collection points. Soil blending may be considered for a portion of Area B (see Figure 3) to provide better contact in the dense, low-permeable soil. However, caution would be required due to the proximity of the Route 125 embankment. A geotechnical analysis and consultation and coordination with the New Hampshire Department of Transportation would be required if this method of oxidant delivery is implemented in Area B. The oxidant delivery strategy will be finalized during remedial design.

Environmental Monitoring: Environmental monitoring would be performed from numerous existing and newly installed wells in order to evaluate the progress/success of the remedy. Monitoring of VOCs and 1,4-dioxane, as well as metals would be performed to assess contaminant destruction, determine progress towards attainment of remedial action objectives, and evaluate potential metals mobilization. Groundwater geochemical parameters, including: dissolved oxygen; pH; oxidation reduction potential; and conductivity, would also be monitored.

Surface water and sediment samples would also be collected from Country Pond to monitor potential contaminant migration into the pond.

This alternative also includes continued monitoring of select residential wells on an annual basis, consistent with the annual residential well monitoring program that NHDES has been performing since 1992.

Institutional Controls: Institutional controls are administrative actions that minimize the potential for human exposure by restricting resource usage. Institutional controls

would be implemented in the form of the establishment of deed restrictions and/or notices to establish a groundwater restriction area which would also be integrated into a State Groundwater Management Zone (GMZ) and a land-use restriction to prevent digging into contaminated substrates or disturbance of remedial components (including monitoring and injection wells) on the Site and on areas of abutting properties. Institutional controls would also include a requirement to evaluate the vapor intrusion pathway should any structures be contemplated within the groundwater restriction area. The groundwater restriction area would also include areas to the east of Route 125 and to the properties adjacent to the State-owned property to the north and south, as shown on Figure 4. The groundwater restriction area would be retained until the groundwater cleanup goals shown in Table B-1 are met. Table 1 also provides the maximum concentrations of contaminants detected during the latest 2004, 2005 and 2007 sampling rounds and their locations.

Updated Remedial Action Objectives and Cleanup Goals: The remedial action objectives (RAOs) as stated in the 1987 ROD have been updated to reflect current Site conditions and current EPA guidance (USEPA, 1988). The updated RAOs for groundwater are summarized in Table B-2 in Appendix B. While the overall objective is still restoration of groundwater for future use at the Site, the human health RAO for Site groundwater includes the objective of minimizing risks to human health from potential future consumption of and direct contact with the groundwater. RAOs have also been included to minimize migration of contaminated groundwater to the Country Pond Marsh wetland area, and minimize the impacts of the groundwater remedy on nearby wetlands, North and South Brooks, and Country Pond.

To support these RAOs, updated remediation criteria for groundwater have also been developed based on current knowledge of Site groundwater contamination and current Federal and State regulations and guidelines. The remediation criteria consist of numeric clean up goals and Applicable or Relevant and Appropriate Requirements (ARARs). The ARARs are discussed in Sections VI and VIII of this Amendment. For the Site's groundwater, the following approach was used to develop cleanup goals for contaminants that did not have cleanup goals established in the 1987 ROD.

First, chemical-specific ARARs were identified for the types of contaminants identified in the ROD as being of primary concern, namely VOCs, metals, and total PCBs. The contaminant 1,4-dioxane was also included, although not identified in the 1987 ROD, because it was first found to be present during sampling performed in 2004 at concentrations of potential concern. The chemical-specific ARARs that apply or are relevant and appropriate for the Site's groundwater are the Federal MCLs and the New Hampshire Ambient Groundwater Quality Standards (AGQS), (see Table B-3a for a discussion of chemical-specific ARARs). For compounds that have both MCLs and AGQS, the values are equivalent, but the list of compounds for which there are AGQS is greater than the list of compounds for which there are MCLs. Groundwater data from samples collected in 2004 and 2005 was searched using the Site groundwater database to identify any exceedances of AGQS. Those analytes that were found at concentrations exceeding an AGQS in at least one groundwater sample collected in 2004 or 2005 ((M&E, 2005a) were identified as Contaminants of Concern (COCs). The 2007 vertical profiling data (M&E, 2007a) for locations where both mobile laboratory and CLP

Routine Analytical Services (RAS) analyses were performed were then reviewed, to determine whether any of the compounds analyzed should also be added as COCs if not already included on the list after review of 2004 and 2005 data. Based on review of 2007 data, it was decided that the xylenes (m/p xylene and o-xylene) should be added as COCs, because there were exceedances of the AGQS for total xylenes (m/p xylene plus o-xylene) based on mobile laboratory results, although xylenes were not identified as exceeding AGQS during the database search of 2004 and 2005 data. In addition, if an analyte was identified in the 1987 ROD as being of potential concern, it was included in the list of COCs even if it was not detected above its AGQS in 2004, 2005, or 2007.

The resultant list of COCs and cleanup levels for the Site are presented in Table B-3 (Appendix B), along with the Federal and State MCLs, NH AGQS, and NHDES Risk Characterization and Management Policy (RCMP) standards (GW-1 and GW-2). Note that the NH AGQS and the NH GW-1 standards are equivalent. The GW-2 standards are cited as guidelines for when an evaluation of the vapor intrusion pathway should be conducted. It is noted that the AGQS/GW-1 standards are lower than the GW-2 standards for those COCs for which GW-2 standards exist. Therefore, it is anticipated that meeting the RAO for Site groundwater based on drinking water exposures will also reduce potential risks from vapor intrusion to levels below the EPA guidelines for baseline risks and hazards at a Superfund site.

A comparison of the original 1987 groundwater remedy and the amended groundwater remedy is provided in the following table.

Original Groundwater Remedy	**Amended Groundwater Remedy**
Groundwater extraction wells were to be located within source areas west of Route 125 and within the marsh area downgradient of the source areas. A groundwater treatment plant including metals precipitation, filtering, an advanced oxidation unit, liquid and vapor phase carbon, and sludge thickening and dewatering was to be constructed. Groundwater monitoring wells would have been installed at the Site and on portions of abutting properties to evaluate the progress of the groundwater cleanup Restrictions would have been placed on land and groundwater use at the Site and on portions of abutting properties until the contaminants in the groundwater have been reduced to safe levels.	Groundwater injection wells and/or other means (e.g., soil blending) will be used to inject an oxidizing agent directly into the groundwater to destroy or reduce the organic contaminants to safe levels. Additional groundwater monitoring wells will be installed at the Site and on portions of abutting properties to evaluate the progress of the groundwater cleanup. Restrictions will be placed on land and groundwater use at the Site and on portions of abutting properties until the contaminants in the groundwater have been destroyed or reduced to safe levels.

V. DESCRIPTION OF ALTERNATIVES EVALUATED

Periodic monitoring would be a component of each additional alternative listed below, except Alternative GW-1, No Action, in order to evaluate changes at the Site (GW-1 does however include limited monitoring for five-year reviews). Institutional Controls, including a groundwater restriction area incorporated into a Groundwater Management Zone (see Figure 4), would also be a component of each alternative (except GW-1) to prevent potable use of groundwater within the contaminated zone until PRGs are attained and to prevent disturbance to remedial components of the remedy. Institutional controls are already in effect for the State-owned property (GLCC parcel see Figure 2) in the form of a deed notice that informs anyone reviewing the property's title that the property may not be used for residential or day care uses, because the OU4 soil remediation left contaminated soil on site at depth. If the State-owned property is to be redeveloped, a risk evaluation of the vapor intrusion pathway will be required to ensure that structures that could be placed on the property would not be impacted by soil gas from the residual groundwater VOC plumes that may be present at that time. If the State were ever to transfer any property interest in the parcel they would create an institutional control that will run with the land and will apply to all future holders of any property interest in the restricted area. Since contaminants will remain on site, five-year site reviews would be conducted to evaluate the remedy as required by CERCLA and the NCP.
A description of the alternatives evaluated is provided below. A more detailed discussion can be found in the Feasibility Study Addendum Report (M&E, 2007a).

ALTERNATIVE GW-1: NO-ACTION

This alternative was developed as a baseline for comparison to the other two alternatives in accordance with the NCP and RI/FS guidance (USEPA, 1988). No remedial action occurs in this alternative other than limited monitoring to support five-year reviews.

ALTERNATIVE GW-2: *IN-SITU* CHEMICAL OXIDATION (AMENDED GROUNDWATER REMEDY)

In-situ chemical oxidation involves the injection of an oxidant into the saturated zone to break down contaminants into non-hazardous by-products such as water, salt, and carbon dioxide. The chemical oxidants most commonly employed to date include hydrogen peroxide, Fenton's Reagent, ozone, sodium or potassium permanganate, and activated persulfate. These oxidants have been able to cause the rapid and complete chemical destruction of many toxic organic chemicals. Other organics undergo partial degradation, leaving by-products that are amenable to subsequent bioremediation.

Field applications have clearly affirmed that matching the oxidant and *in-situ* delivery system to the COCs and the site conditions is the key to successful implementation and achieving performance goals (USDOD, 2002). For the Site, an oxidant capable of degrading benzene, toluene, ethylbenzene, xylenes, (BTEX compounds), chlorinated ethenes (PCE, TCE), and 1,4-dioxane is required. Possible oxidants include Fenton's Reagent, ozone combined with hydrogen peroxide, and activated persulfate (ITRC, 2005). Persulfate is more stable than ozone or Fenton's Reagent, which would allow

more time for contact with contaminants. An oxidant would be injected into the groundwater in the three areas (A, B and North Plume) shown in Figure 3.

Oxidant delivery is usually conducted via injection into wells or temporary injection points. In some cases, oxidant has been delivered via soil blending, using large augers or excavator-mounted mixing equipment. It is anticipated that multiple injections or applications would be conducted over a period of three years.

Environmental monitoring would be required to assess the progress and success of the remedy. Although remediation of the source areas west of Route 125 will likely take on the order of 5 years, attenuation of the extended plume east of Route 125 will take additional time to occur once the source areas west of Route 125 are treated. It is assumed that monitoring of the extended plume would need to be performed for approximately 30 years.

Five-year site reviews would be conducted to evaluate the remedy as required by CERCLA and the NCP. Institutional controls (deed notices/easements and establishment of a GMZ, see Figure 4) would also be implemented to avoid contact with contaminated groundwater and vapor until all RAOs are met and to prevent disturbance to components of the remedy, such as monitoring and injection wells.

ALTERNATIVE GW-3: GROUNDWATER EXTRACTION AND TREATMENT (THE 1987 GROUNDWATER CLEANUP PLAN)

The alternative consists of extracting groundwater from the source zones (high concentrations of VOCs) using new and/or existing extraction wells. Such action will limit the migration of contaminated overburden groundwater. Extracted groundwater would be piped to a centralized treatment system. Treated groundwater would be allowed to either infiltrate into groundwater through an infiltration basin (preferred) or discharged to surface water (see Figure 5). Environmental monitoring would be implemented to assess the success of the remedy.

The 1987 ROD estimated that groundwater extraction and treatment would occur for five years. At that time, an evaluation of the technical feasibility of the remedy achieving target contaminant levels was to be conducted, if target levels had not been attained. Achievement of target levels was defined as the continuous detection of specified contaminants of concern at or below target concentrations for a period of three years at the Route 125 Site boundary and at selected on-site monitoring wells.

The groundwater pump and treat time frame has been updated based on the information obtained during the 2004/2005 pump test and treatability study (M&E, 2005b) and the 2007 vertical profiling effort (M&E, 2007a). It is now estimated that the groundwater extraction and treatment system would operate for a period of 10 years for Area A and the Northern Plume, and an additional 20 years for Area B (see Figure 3). Time of remediation estimates were made using the Natural Attenuation Software (NAS) model developed by the United States Geological Survey (M&E, 2007b).

Five-year site reviews would be required to evaluate the remedy as required by CERCLA and the NCP. Institutional controls (deed notices/easements and establishment of a GMZ, see Figure 4) would also be implemented to avoid contact with contaminated groundwater and vapor until all RAOs are met and to prevent disturbance to components of the remedy, such as monitoring and extraction wells.

VI. COMPARATIVE ANALYSIS OF THE ORIGINAL 1987 GROUNDWATER REMEDY AND THE AMENDED REMEDY

Section 121(b)(1) of CERCLA presents several factors that EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing remedial alternatives. These criteria are as follows:

THRESHOLD CRITERIA: In accordance with the NCP, two threshold criteria must be met in order for the alternative to be eligible for selection:

1. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection, and describes how risks posed through each exposure pathway are eliminated, reduced or controlled through treatment, engineering controls or institutional controls.

2. **Compliance with applicable or relevant and appropriate requirements (ARARs)** addresses whether or not a remedy will meet all of the ARARs of promulgated Federal and equal or more stringent state and environmental and facility-siting requirements, and if not, provides the grounds for invoking a CERCLA waiver(s) for those requirements.

PRIMARY BALANCING CRITERIA: The following five criteria are used to compare and evaluate those alternatives which fulfill the two threshold criteria.

1. **Long-term effectiveness and permanence** assesses alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will be successful.

2. **Reduction of toxicity, mobility or volume through treatment** addresses the degree to which alternatives employ recycling or treatment to reduce toxicity, mobility or volume, and how treatment is used to address the principle threats posed by the site.

3. **Short term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation of the alternative until cleanup goals are achieved.

4. **Implementability** addresses the technical and administrative feasibility of an alternative, including the availability of materials and services needed to implement a particular option.

5. Cost includes estimated capital as well as operation and maintenance costs, on a net present-worth basis.

MODIFYING CRITERIA: The two modifying criteria discussed below are used in the final evaluation of remedial alternatives generally after EPA has received public comment on the RI/FS and Proposed Plan.

1. State acceptance addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers. The State has issued a letter on concurrence with EPA's selected remedy (Appendix C).

2. Community acceptance addresses the public's general response to the alternatives described in the remedial investigation, feasibility study and Proposed Plan. The EPA has reviewed all submitted public comments and they are addressed in a Responsiveness Summary (Appendix D).

COMPARATIVE ANALYSIS: The following is a comparison of the groundwater pump and treat remedy selected in the 1987 Record of Decision (original remedy) and the ISCO groundwater remedy selected in this Amended Record of Decision (amended remedy). The comparison contrasts each remedy's strength and weaknesses with respect to the nine evaluation criteria presented above.

1. Overall Protection of Human Health and the Environment

As noted in Section II, there are potential future human health risks due to VOCs, PCBs, and metals in groundwater at the Site. Both the original remedy and the amended remedy are protective of human health as long as institutional controls are enforced until the groundwater cleanup goals have been achieved.

It is anticipated that the amended remedy would neither positively nor adversely impact the hydrology of the wetlands to the east of Route 125, except potentially from the installation and operation of additional monitoring wells. Oxidant injections would be monitored to prevent migration of oxidants or oxidant residuals into wetlands or surface water bodies at concentrations that could potentially have adverse impacts. Installation of injection wells could result in temporary adverse impacts to wetlands in the area of the Northern Plume. Remaining ecological risks (if any) from the migration of contaminated groundwater into the wetland would not be mitigated by this alternative in the near term. Over the long term, reduction in contaminant mass west of Route 125 will reduce the concentration and extent of the extended plume east of Route 125 so that there will be no remaining risks to ecological receptors.

The original remedy would cause short-term, minor impacts to ecological habitat due to the collection/treatment system installation, as well as from the installation of additional monitoring wells east of Route 125. In addition, potential changes to Site hydrology may impact the wetland area east of Route 125. Extraction of groundwater would likely have

some impact to the wetlands on the adjacent property to the north. Remaining ecological risks (if any) from migration of contaminated groundwater into the wetland would be mitigated in the near term, because the extraction system would capture contaminated overburden groundwater west of Route 125, thereby preventing its migration into the wetland.

2. Compliance with Applicable and Relevant and Appropriate Requirements

Chemical-specific standards under the Federal Safe Drinking Water Act, State Drinking Water Standards, and State Ambient Groundwater Quality Standards set levels for ground water cleanup to restore the ground water to drinkable status. The amended remedy (which includes long-term monitoring of the extended plume) meets chemical-specific levels west of Route 125 over a relatively short period of time (approximately five years). East of Route 125 chemical-specific groundwater standards will be achieved over the long-term as a result of the source control measures taken west of Route 125 and natural processes which will reduce contaminant levels over time. The original remedy would have met all chemical-specific cleanup levels through removal and treatment west of Route 125, but the time frame has been estimated to take longer than for the amended remedy because of the low permeability of the soils in Area B (see Figure 3). East of Route 125 chemical-specific groundwater standards will be achieved over the long-term as a result of the source control measures taken west of Route 125 and natural processes which will reduce contaminant levels over time.

Location-specific ARARs for the original remedy and the amended remedy pertain to wetland resources within the area of the contaminated groundwater plume that may be affected by monitoring well installation and operation. Construction of the original and amended remedy may occur within or near protected resources. The original remedy would also affect water levels in the surrounding wetlands since the pumping and re-infiltration of treated groundwater would potentially alter hydrological patterns. As required under Section 404 of the Federal Clean Water Act, EPA has determined that the amended remedy is the least damaging practicable alternative in regards to protecting wetland resources. This is because it will achieve cleanup goals significantly faster (so will remove the contaminants that threatened wetland resources sooner) and the physical impacts are less (since the treatment is *in-situ*). In particular, the amended remedy will not alter the hydrology of the wetlands around the Site. There also are location-specific standards for consultation on fish and wildlife impacts from the remedial activities for both the original and amended remedies.

Action-specific ARARs for the original and amended remedies address establishment of institutional controls; surface and groundwater monitoring; well installation, remedy operation, and closure. In addition, there are standards for hazardous waste testing and handling for any monitoring waste generated. For the amended remedy, there are additional standards for constructing and operating the ISCO system. Hazardous waste testing and handling standards apply to any expended media generated by the ISCO system, which could include unused oxidants. Furthermore, the amended remedy includes standards for the injection of substances into the groundwater to facilitate the in-situ process.

The original remedy would comply with action-specific ARARs for the construction, operation, and eventual closing of the pump and treat system. Specific standards address well installation, operation, and closure; construction and operation of the pump and treatment system; waste testing and handling; controlling air emissions; and discharge standards for treated groundwater either to surface waters or re-injection back into the groundwater. The treatment system will generate contaminated sludges and treatment media that will need to be managed and disposed of under applicable standards.

All chemical-specific, location-specific and action-specific ARARs for both the original remedy and the amended remedy can be achieved. However, from a ARARs perspective, the amended remedy is preferred because it is the least damaging practicable alternative for protecting wetland resources.

3. Long-Term Effectiveness and Permanence

The residual groundwater risk at the Site will be equally reduced under the original and amended remedies as long as they are monitored, maintained, and operated properly. Both the original and amended remedy will result in permanent reductions in contaminant concentrations to below applicable risk levels and federal and state standards. Both the original and amended remedy permanently address the groundwater contamination west of Route 125 and therefore will protect ecological resources in the downgradient wetlands east of Route 125 over the long-term.

4. Reduction of Toxicity, Mobility, and Volume through Treatment

The amended remedy includes *in-situ* treatment processes. The amended remedy will not generate any contaminant waste streams that will require off-site disposal.

The original remedy includes *ex-situ* treatment processes. A treatment train of groundwater treatment processes likely including metals precipitation and filtering, an advanced oxidation unit, liquid and vapor phase carbon, and sludge thickening and dewatering, would be required. The original remedy will not fully treat all contaminants, but will instead generate a number of waste streams that will require off-site disposal.

The amended remedy will treat all volatile organic compounds and 1,4-dioxane west of Route 125, assuming that the oxidant can be effectively injected to make contact with all the contamination. An estimate of the amount of contaminant destruction is not possible because the total mass of contaminant present in the subsurface is not accurately known. The original remedy would treat most of the groundwater contaminants by capturing the contaminated groundwater from hot spot locations and preventing further migration of contaminated groundwater to the Country Pond Marsh area.

The original and amended remedy would reduce toxicity of most COCs through treatment. However, the amended remedy can possibly produce by-products which are still toxic. These by-products are expected to degrade over a relatively short time frame. The original remedy would reduce the toxicity, mobility and volume of contaminants in the groundwater, but would generate waste streams that would be more concentrated in toxicity and would require off-site disposal.

With respect to the treatment processes for the original and amended remedy, both systems are irreversible. In looking at each remedy as a whole, stopping either remedy would not create a situation where the Site returns to its original conditions.

5. Short Term Effectiveness

Short-term risks include any additional risks to the community or workers at the Site from exposures to COCs as a result of construction measures and implementation of remedial activities.

The original and amended remedy have nominal increases of short-term risks to the community and workers due to remedy construction, operation and monitoring. Air sampling and monitoring will be used to evaluate any potential risks to the community from inhalation exposures. Concentrations of COCs are expected to be limited, but greatest on-site. Therefore, workers at the Site will use appropriate personal protective equipment to mitigate any potential risks from exposures to COCs.

The remedial technologies evaluated differ in the magnitude of the potential impacts to natural habitats. The amended remedy will have only limited environmental impacts, potentially in the Northern Plume area where there would be disturbance of the wetlands to install injection wells and inject oxidants, and east of Route 125 where monitoring wells may need to be installed in the wetlands. The original remedy may alter site hydrology, likely impacting the wetlands north of the Site and potentially impacting wetlands east of Route 125 both from changes to hydrology and from the installation of additional monitoring wells.

The amended remedy is expected to achieve the remedial action objectives (RAOs) quickly (approximately 5 years) for the area west of Route 125. The amended remedy is also expected to result in RAOs being achieved east of Route 125 within 30 years. The original remedy is expected to achieve RAOs within 30 years for the area west of Route 125, but it is not known how long it may take for the original remedy to achieve RAOs east of Route 125. It is anticipated that it will take longer than for the amended remedy. The original remedy is anticipated to take longer primarily because of the low permeability of Area B soils (see Figure 3).

6. Implementability

Both the original and the amended remedy are considered to have moderate degrees of implementability. A more detailed discussion comparing the implementability characteristics of these two alternatives is provided below.

Technical Feasibility

Implementability with regard to the technical feasibility of an alternative includes an evaluation of three factors: 1) ability to construct, operate and maintain the technologies, 2) the reliability of the technologies, and 3) the ease of undertaking additional remedial actions, if warranted by site conditions determined after implementation of the remedy. Each of these three factors is described for the alternatives evaluated.

The ability to construct, operate and maintain the technologies associated with the original and amended remedy is proportional to the degree or intensity of each remedy. Alternatives which use more intensive remedial technologies such as containment and *in-situ* or on-site treatments will have the greatest difficulty in implementing construction and operation and maintenance (O&M).

The original and amended remedies contain remedial technologies that can be considered "reliable" in terms of relying or counting on the day-to-day functioning of the remedy as intended. This assessment is dependent on the assumption that proper construction techniques and operation and maintenance efforts are provided as appropriate to the level of the technology. Clearly, maintaining a pump and treat system required by the original remedy will require a higher degree of effort than the biannual injections of oxidant used in the amended remedy. Therefore, from the point-of-view of maintaining day-to-day function, the amended remedy will be easiest to implement, and the original remedy would be more difficult to implement.

In terms of achieving the remedial action objectives, however, the reliability of an alternative is often proportional to the greater intensity of the remedial actions contained in the alternative. The original and amended remedies provide a high level of reliability that the remedial action objectives can be achieved, although some contaminants under Route 125 may remain unreachable by either technology. It should be noted that there is some degree of uncertainty related to the reliability of amended remedy due to the nature of *in-situ* work within the subsurface. There are similar concerns regarding the ability of the original pump and treat system to capture inorganic contaminants (metals) due to their propensity to adsorb to soils. Regardless of these concerns, both the original and amended remedies are considered reliable.

The ease of undertaking additional remedial actions, if warranted by future site conditions or requirements, is also proportional to the degree or intensity of each remedy. Alternatives that use more intensive remedial technologies such as containment, *in-situ*, or on-site treatment remedies will have the greatest difficulty in undertaking and implementing additional remedial actions. Conversely, alternatives which utilize less intensive technologies such as institutional actions can more easily implement additional remedial actions. The original and amended remedies allow for low effort to implement additional, future remedial actions.

Administrative Feasibility

The amended remedy has few administrative issues. The original remedy will have some administrative issues regarding off-site disposal of treatment wastes. Both the original and amended remedies will require administrative efforts to install wells on off-site properties and to establish the institutional controls.

Availability of Services and Materials

Implementability with regard to the availability of services and materials includes an evaluation of three factors: 1) availability or usage of off-site treatment, storage, and

disposal facilities (TSDFs), 2) availability of necessary or specialized equipment or specialist personnel needed to implement the alternative, and 3) availability of prospective technologies required by the alternative.

The original remedy would require long-term use of off-site TSDF services to dispose of treatment residuals, whereas the amended remedy would only require the use of TSDF services during the installation of injection points (disposal of soils generated as investigation derived waste), and possibly disposal of excess oxidant chemicals. Other services and materials are easy to obtain for both original and amended remedies.

7. Cost

The total net present worth (capital costs plus O&M and periodic costs over the duration of the remedial action) for the amended remedy is $6,267,000 (Table B-4), while the current estimated net present worth is $11,825,000 (Table B-5) for the original remedy. A discount factor of 7% was used to calculate the net present worth value for amended and original remedies.

8. State Acceptance

This criterion addresses whether, based on its review of the data derived from the Site and the Proposed Plan, the State concurs with, opposes, or has no comment on the remedy the EPA has selected for the Site. Refer to Section IX for the State's perspectives on the EPA's proposed groundwater cleanup plan for the Site.

9. Community Acceptance

This criterion addresses whether the public concurs with EPA's proposed amended remedy. Community acceptance of this amendment to the 1987 ROD was evaluated based on comments received at the August 23, 2007 Public Hearing and during the public comment period. Refer to Section X for the Community's perspective on the EPA's proposed groundwater cleanup plan for the Site.

VII. THE SELECTED REMEDY

Based on information and data generated since the issuance of the 1987 ROD and after the careful study of alternative groundwater cleanup technologies, the EPA believes that *in-situ* chemical oxidation (ISCO) is the best balance between the nine criteria noted above. The selected remedy is comprised of the following:

- Injecting an oxidizing agent directly into the groundwater to destroy or reduce the organic contaminants to safe levels.

- Installing monitoring wells at the Site and on portions of abutting properties to evaluate the progress of the groundwater cleanup.

- Placing restrictions on land and groundwater use at the Site and on portions of abutting properties until the contaminants in the groundwater have been destroyed or reduced to safe levels.

The estimated total net present worth cost of the selected remedy is $6,267,000. Table B-4 provides a cost estimate for the selected remedy based on the best available information regarding the anticipated scope of the remedy.

VIII. STATUTORY DETERMINATIONS

The remedial action selected herein for implementation at the Site is consistent with CERCLA Section 121 and, to the extent practicable, the NCP.

THE SELECTED REMEDY IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy will be protective of human health and the environment. There are no significant short-term risks to human health or the environment during implementation of the selected remedy. The potential exposure of Site workers and area residents to contaminants will be minimized by using health and safety plans that includes air monitoring to assess potential releases to the air during cleanup operations. The selected remedy is expected to reduce and eventually eliminate any potential future groundwater risks posed by the Site.

THE SELECTED REMEDY ATTAINS ALL ARARs

This section briefly summarizes the most significant chemical, location and action specific ARARs for the remedy. A complete list all the chemical, location and action specific ARARs are provided in Tables B-3a, B-3b and B-3c.

Chemical-Specific ARARs

Chemical-specific ARARs govern the extent of site cleanup and provide either actual clean-up levels or a basis for calculating such levels. These requirements are usually health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in numerical values which help define the degree of cleanup.

Chemical-specific standards under the Federal Safe Drinking Water Act, State Drinking Water Standards, and State Ambient Groundwater Quality Standards set levels for groundwater cleanup to restore the groundwater to drinkable status. The amended remedy (which includes long-term monitoring of the extended plume) meets chemical-specific levels west of Route 125 over a relatively short period of time (approximately five years). East of Route 125 (the extended plume), chemical-specific groundwater standards will be achieved over the long-term as a result of the source control measures

taken west of Route 125 and natural processes which will reduce contaminant levels over time.

Location-Specific ARARs

Location-specific ARARs are restrictions relating more directly to the geographical or physical setting of the site. These locations include natural site features such as wetlands and flood plains, as well as manmade features including existing landfills, disposal areas, and local historic buildings. Location-specific ARARs are generally restrictions on the concentration of hazardous substances or the conduct of activities solely because of the site's particular characteristics or location. These ARARs provide a basis for assessing existing site conditions and subsequently aid in assessing potential remedial alternatives.

There may be unavoidable adverse impacts to wetlands. The amended remedy may result in the alteration of wetlands during the process of injection and monitoring well installation and operation. EPA has determined that in balancing the potential negative effects of the alternative versus the environmental benefits to wetlands from cleaning up site contamination, that the amended remedy is the least damaging practicable alternative. Although implementation of the amended remedy may result in short-term damage to wetland resources, it provides faster and better treatment of the Site's contaminated groundwater, which poses an ongoing risk to the areas wetlands. EPA has evaluated the requirements of the applicable regulations, including Section 404 of the federal Clean Water Act and identified the proposed alternatives as the least damaging practicable alternatives to protect federally regulated wetlands both on-site and downstream. All other Federal and State location-specific standards requiring consultation with Federal resource agencies regarding fish and wildlife habitat protection issues; and protecting floodplains and surface waters will also be complied with.

Action-Specific ARARs

Action-specific ARARs are usually technology or activity-based limitations or requirements that control actions at CERCLA sites. After remedial alternatives are developed, action-specific ARARs pertaining to proposed site remedies provide a basis for assessing the feasibility and effectiveness of the remedies. These requirements generally define acceptable treatment, storage, and disposal procedures for hazardous substances during the response action.

Action-specific ARARs for the amended remedy address establishment of institutional controls; surface and groundwater monitoring; well installation, remedy operation and closure. In addition, there are standards for hazardous waste testing and handling for any monitoring waste generated and standards for constructing and operating the ISCO system. Hazardous waste testing and handling standards apply to any expended media generated by the ISCO system, which could include unused oxidant. Furthermore, the amended remedy includes standards for the injection of substances into the groundwater to facilitate the *in-situ* process.

THE SELECTED REMEDIAL ACTION IS COST-EFFECTIVE

The net present worth cost of the original remedy is estimated at $11,825,000. The net present worth cost of the amended remedy is estimated at $6,267,000. The amended remedy is as protective of human health and the environment as the original remedy, and it provides the best overall effectiveness in a significantly shorter period of time. Therefore, the selected remedy is cost-effective.

THE SELECTED REMEDY UTILIZES PERMANAENT SOLUTIONS AND ALTERNATIVE TREATMENT OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABE

The selected remedy provides a permanent solution for the contaminated groundwater at the Site. The injection of an oxidant into the contaminated groundwater will permanently destroy or reduce the contamination to safe levels.

THE SELECTED REMEDY SATISFIES THE PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The selected remedy has treatment as the principle element of the remedy. The selected remedy involves injecting an oxidant directly into the contaminated aquifer to destroy or reduce the contamination to safe levels.

IX. STATE ROLE

This criterion addresses whether, based on its review of the data derived from the Site and the Proposed Plan, the State concurs with, opposes, or has no comment on the remedy the EPA has selected for the Site.

The New Hampshire Department of Environmental Services (NHDES) has reviewed the July 2007 Proposed Plan to Amend the 1987 Cleanup Plan and a draft of this Amended Record of Decision. The NHDES concurs with the remedy change. The NHDES has provided a letter of concurrence which is provided in Appendix C.

X. PUBLIC PARTICIPATION

The public participation requirements set out in Section 300.435(c)(2)(ii) of the NCP have been met. This criterion addresses whether the public concurs with EPA's proposed Amendment. Community acceptance of this Amendment to the 1987 ROD was evaluated based on comments received at the August 23, 2007 Public Hearing and public comments received during the public comment period. Refer to Appendix D for EPA's Responsiveness Summary to the public comments received during the 30-day public comment period.

The EPA has determined that, based on public comment, no significant change is needed to the proposed amended cleanup plan. This ROD Amendment has full community support.

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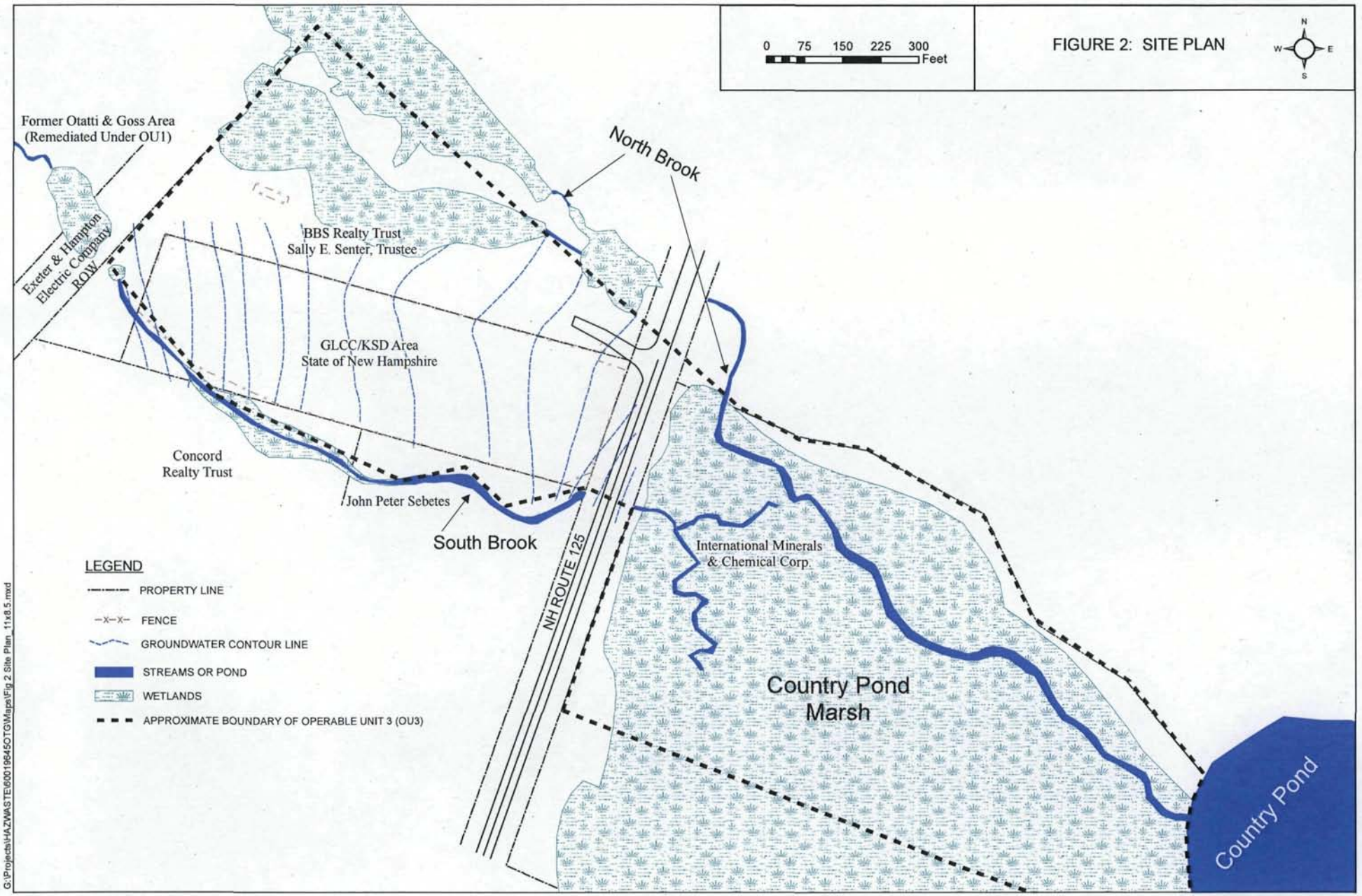
APPENDIX A

FIGURES


Sandpit
Sandpit
Sandpit
Route 125
North Brook
OTTATI & GOSS
SUPERFUND SITE
Sandpit
Substations
South Brook
Country Pond
ROAD
Campground
Campground
Country
Mill Hill
Cem
VT
ME
NY
Site
NH
MA
FIGURE 1
LOCATION MAP
OTTATI & GOSS SUPERFUND SITE
METCALF & EDDY | AECOM
0 250 500 1,000 1,500 2,000
Feet
G:\Projects\HAZWASTE\60019645_OG\Maps\Fig 1 Site Locus and Features.mxd



G:\Projects\HAZWASTE\60019645OTG\Maps\Fig 2 Site Plan_11x8.5.mxd

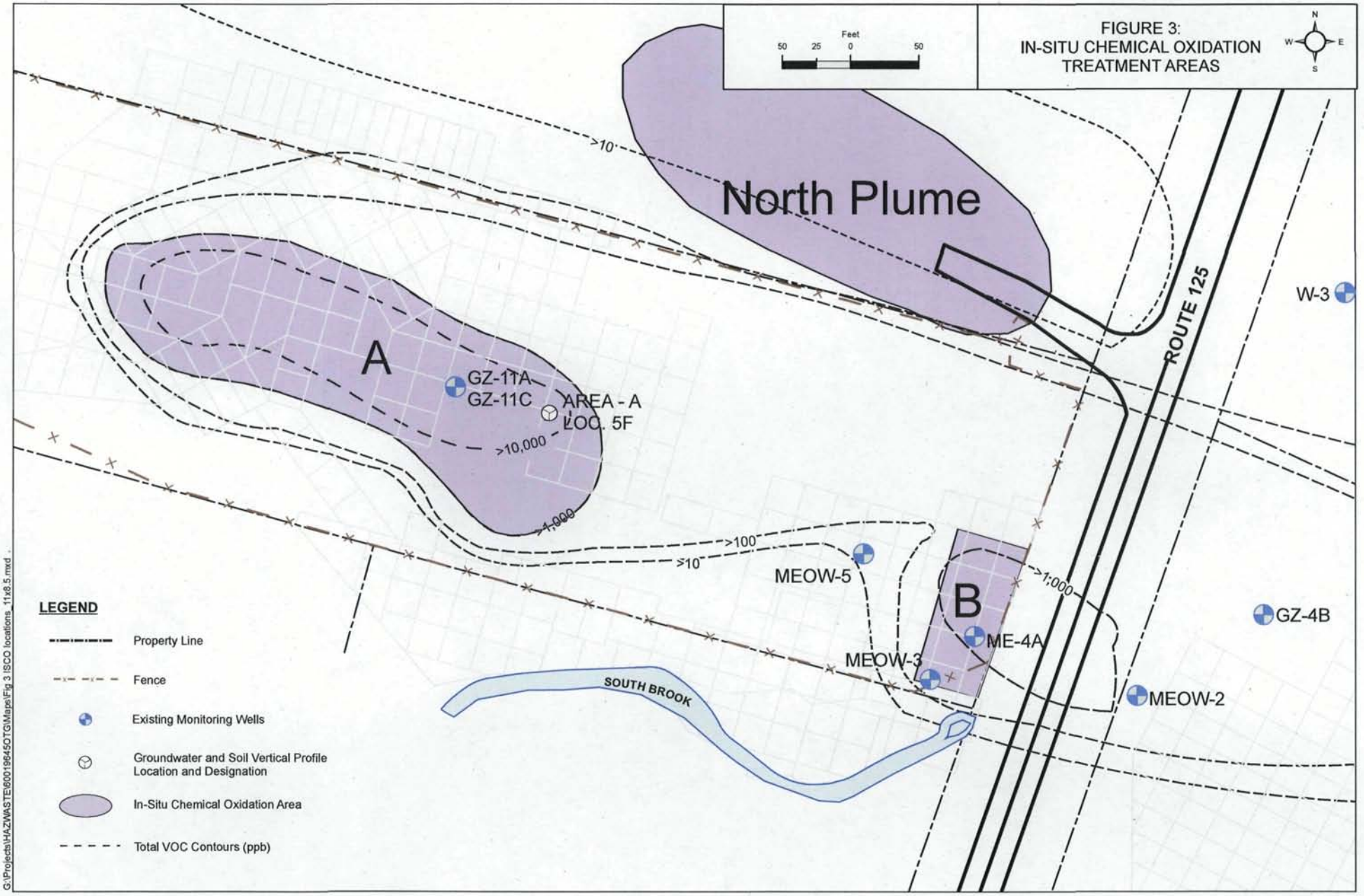
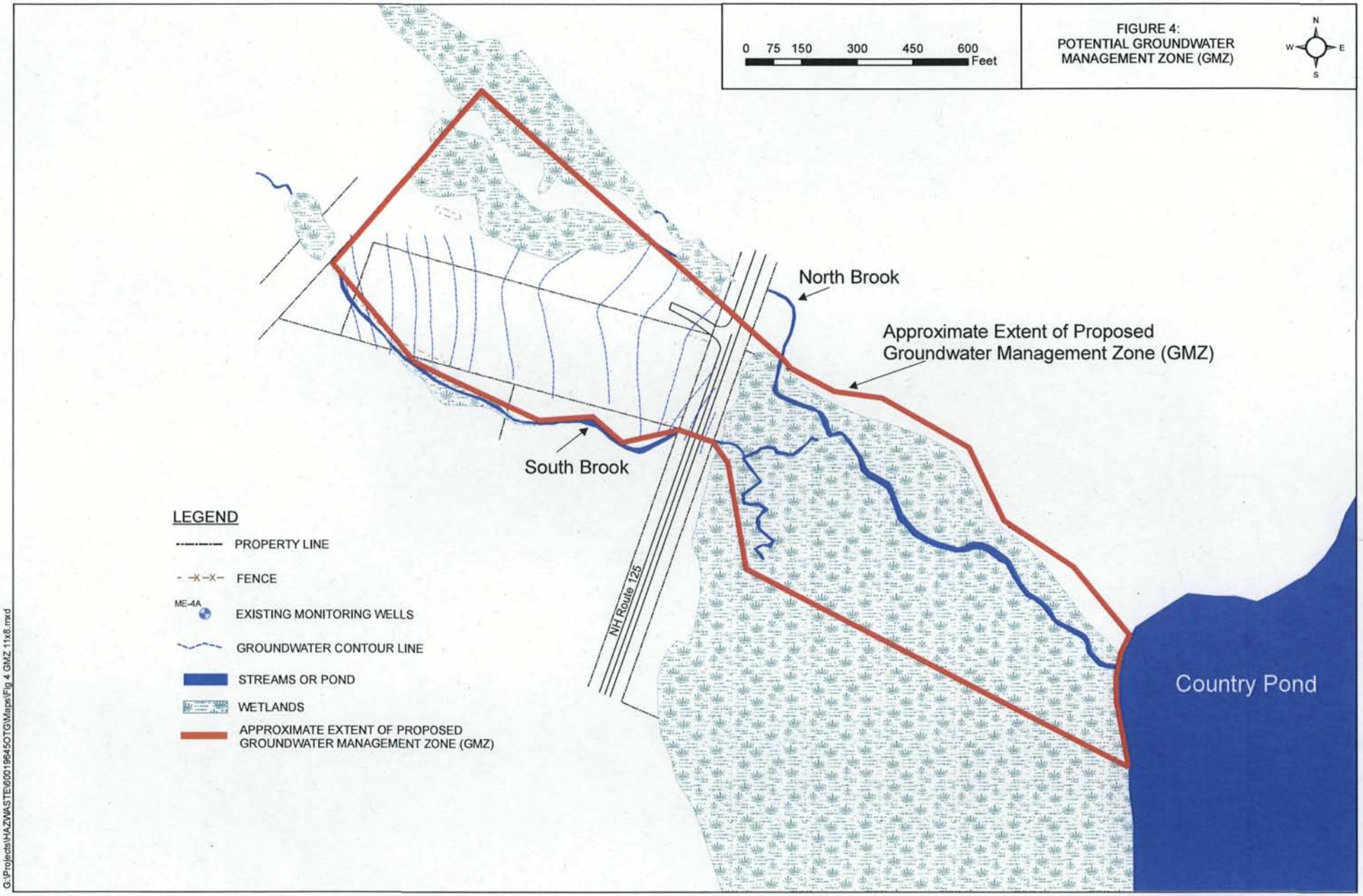


FIGURE 3:
IN-SITU CHEMICAL OXIDATION
TREATMENT AREAS
Feet
50 25 0 50
N
W E
S
North Plume
A
B
GZ-11A
GZ-11C
AREA - A
LOC. 5F
>10,000
>1,000
>100
>10
>10
1,000
MEOW-5
MEOW-3
ME-4A
SOUTH BROOK
ROUTE 125
W-3
GZ-4B
MEOW-2
LEGEND
Property Line
Fence
Existing Monitoring Wells
Groundwater and Soil Vertical Profile
Location and Designation
In-Situ Chemical Oxidation Area
Total VOC Contours (ppb)
G:\Projects\HAZWASTE\60019645\OTGMaps\Fig 3 ISCO locations 11x8.5.mxd


0 75 150 300 450 600
Feet
FIGURE 4:
POTENTIAL GROUNDWATER
MANAGEMENT ZONE (GMZ)
N
W
E
S
North Brook
Approximate Extent of Proposed
Groundwater Management Zone (GMZ)
South Brook
NH Route 125
Country Pond
LEGEND
PROPERTY LINE
FENCE
ME-4A
EXISTING MONITORING WELLS
GROUNDWATER CONTOUR LINE
STREAMS OR POND
WETLANDS
APPROXIMATE EXTENT OF PROPOSED
GROUNDWATER MANAGEMENT ZONE (GMZ)
G:\Projects\HAZWASTE\60019645OTG\Maps\Fig 4 GMZ 11x8.mxd

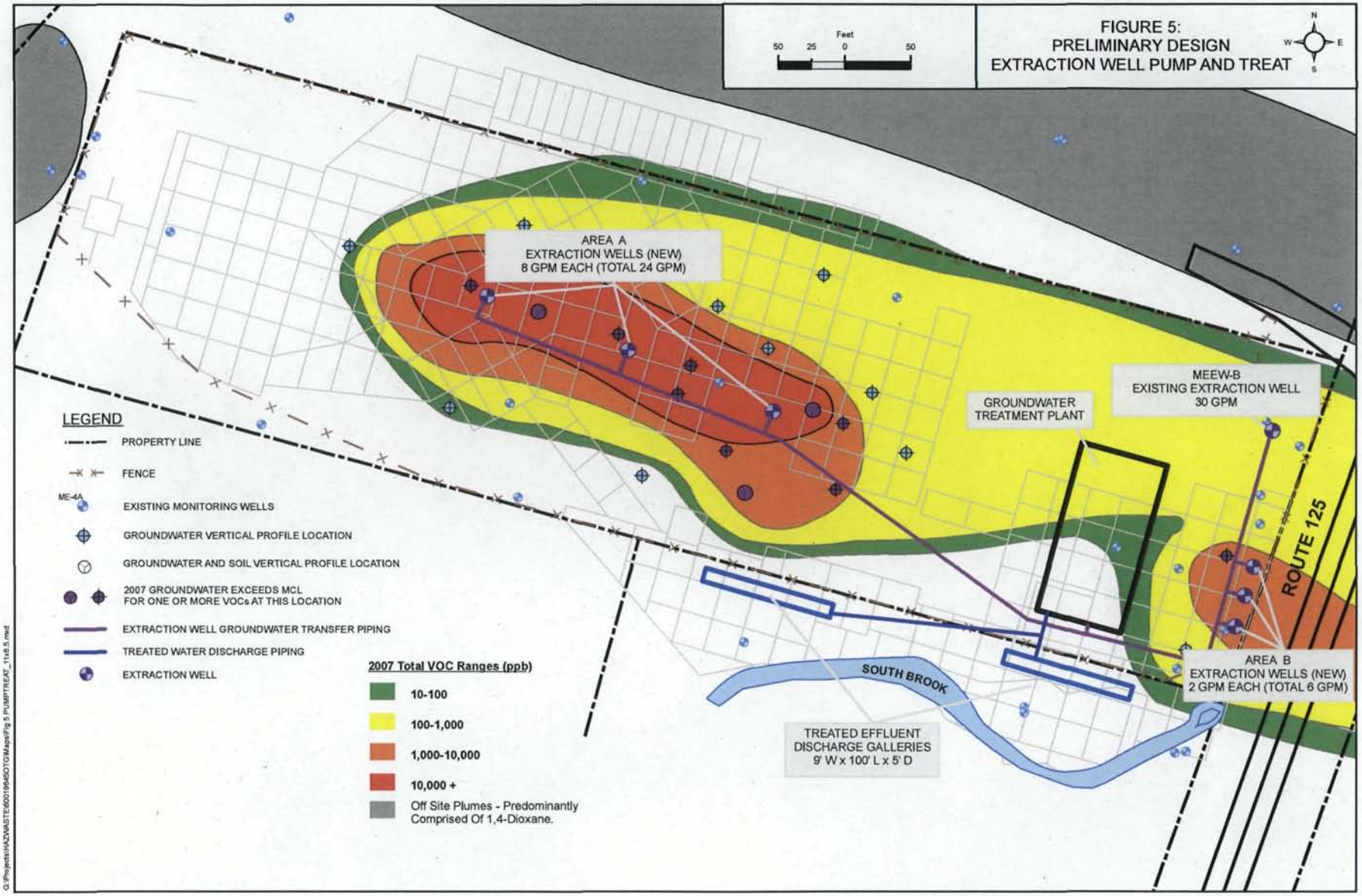


FIGURE 5:
PRELIMINARY DESIGN
EXTRACTION WELL PUMP AND TREAT
Feet
50 25 0 50
N
W E
S
AREA A
EXTRACTION WELLS (NEW)
8 GPM EACH (TOTAL 24 GPM)
MEEW-B
EXISTING EXTRACTION WELL
30 GPM
GROUNDWATER
TREATMENT PLANT
ROUTE 125
AREA B
EXTRACTION WELLS (NEW)
2 GPM EACH (TOTAL 6 GPM)
SOUTH BROOK
TREATED EFFLUENT
DISCHARGE GALLERIES
9' W x 100' L x 5' D
LEGEND
PROPERTY LINE
FENCE
ME-4A
EXISTING MONITORING WELLS
GROUNDWATER VERTICAL PROFILE LOCATION
GROUNDWATER AND SOIL VERTICAL PROFILE LOCATION
2007 GROUNDWATER EXCEEDS MCL
FOR ONE OR MORE VOCs AT THIS LOCATION
EXTRACTION WELL GROUNDWATER TRANSFER PIPING
TREATED WATER DISCHARGE PIPING
EXTRACTION WELL
2007 Total VOC Ranges (ppb)
10-100
100-1,000
1,000-10,000
10,000 +
Off Site Plumes - Predominantly
Comprised Of 1,4-Dioxane.
G:\Projects\HAZWASTE\60019645\OTG\Mapsl\Fig 5 PUMPTREAT_11x8.5.mxd

APPENDIX B

TABLES

Table B-1: Interim Cleanup Levels For Groundwater

Contaminants of Concern in Groundwater	Interim Cleanup Level (parts per billion)	Basis for Cleanup Level	Maximum Concentrations (ppb) and their locations
Volatile Organics			
Benzene	5	MCL[1]	43 at GZ-4B
1,2-Dichloroethane	5	MCL	Not detected above cleanup level in 2004, 2005 or 2007
Cis-1,2-Dichloroethene	70	MCL	790 at GZ-11A
1,4-Dichlorobenzene	75	MCL	100 at ME-4A
Ethylbenzene	700	MCL	1300 at GZ-11A
Hexachlorobutadiene	0.5	AGQS[2]	0.6 at MEOW-2
Methyl-t-butyl ether	13	AGQS	63 at W-3
Naphthalene	20	AGQS	87 at GZ-11A
Styrene	100	MCL	150 at GZ-11A
Tetrachloroethene	5	MCL	560 at GZ-11A
Tetrahydrofuran	154	AGQS	420 at GZ-4B
Toluene	1,000	MCL	1900 at ME-4A
Trichloroethene	5	MCL	460 at GZ-11A
Vinyl Chloride	2	MCL	72 at ME-4A
Total Xylene	10,000	MCL	14,500 at Area A, 5F
1,4-Dioxane	3	AGQS	260 at MEOW-3
Metals			
Arsenic	10	MCL	160 at GZ-4B
Lead	15	AGQS	41.6 at GZ-11C
Manganese	300	EPA Health Advisory	3410 at MEOW-5
Nickel	100	AGQS	Not detected above cleanup level in 2004, 2005 or 2007
Total PCBs	0.5	MCL	1.2 at GZ-11A

(1) Federal Maximum Contaminant Levels for drinking water.
(2) NH Ambient Groundwater Quality Standard.

TABLE B-2. REMEDIAL ACTION OBJECTIVES

MEDIUM AND AREA OF CONCERN	Objectives from 1987 ROD	Updated Remedial Action Objective	BASIS FOR RAO
Site-wide Groundwater			
Groundwater	Minimize risks to human health associated with potential future consumption of and direct contact with groundwater.	Prevent ingestion exposures to groundwater in exceedance of appropriate ARARs or associated with a Hazard Index > 1 and/or Incremental Lifetime Cancer Risk (ILCR) $>10^{-6}$ to 10^{-4} for future residential use as tap water.	The 1987 ROD selected a risk level of 10^{-6} as appropriate for groundwater remediation at the site based on restoring the aquifer for drinking water use.
	Minimize migration of contaminants in groundwater such that groundwater discharging to Country Pond and the associated wetlands is not harmful to human health or aquatic ecological systems.	Limit migration of contaminants from the residual source areas west of Route 125 at concentrations in exceedance of appropriate ARARs or associated with an ingestion HI > 1 and/or ILCR $>10^{-6}$ to 10^{-4} for future residential use as tap water.	The 1987 ROD established Route 125 as a boundary at which target cleanup goals for groundwater were to be met. The Route 125 boundary is also the boundary between uplands (to the west) and wetlands (to the east).
	Minimize potential impacts of implementing the selected alternative on adjacent surface waters and wetlands.	Protect the remediated and restored wetlands East of Route 125 (Country Pond Marsh), and the wetlands north of the State-owned property, from potential damage from actions to remediate groundwater.	Sediments in the wetland East of Route 125 were remediated during the OU4 remedial action (completed in 2002) to meet ecologically-based cleanup goals, and the wetland has been restored. The potential for negative ecological impacts that could result from disturbance to this area, as well as the smaller wetland north of the former GLCC property, must be considered in the development and evaluation of remedial alternatives. The 1987 ROD stated that the groundwater remedy would need to be monitored and adjusted to ensure no detrimental impacts to wetlands from the extraction of groundwater for treatment.
	Meet or exceed all applicable or relevant federal public health or environmental standards, guidance, and advisories.	None. The goal to meet ARARs is now stated in the above updated RAOs.	Compliance with ARARs is one of the threshold criteria for evaluation of remedial alternatives.

TABLE B-3a. CHEMICAL-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE SELECTED REMEDY
ALTERNATIVE GW-2: IN SITU CHEMICAL OXIDATION

Authority	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain ARAR
Federal Requirements	Safe Drinking Water Act (42 U.S.C. §300f *et seq.*); National primary drinking water regulations (40 C.F.R. 141, Subpart B and G)	Relevant and Appropriate	Establishes maximum contaminant levels (MCLs) for common organic and inorganic contaminants applicable to public drinking water supplies. Used as relevant and appropriate cleanup standards for aquifers and surface water bodies that are potential drinking water sources.	Site groundwater is considered a potential drinking water source, and there are private wells downgradient of the plume. Analytes detected in Site groundwater at levels above MCLs are presented (along with the MCLs) in Table A-1 of Appendix A. The in-situ chemical oxdiation remedy will be designed to reduce organic contaminant concentrations to MCLs in the portion of the plume that is west of Route 125. Long-term monitoring of the extended plume east of Route 125 (the wetland area) will be performed to evaluate whether remediation of the residual source areas/plumes west of Route 125 is effective in reducing extended plume contaminant concentrations. Monitoring will continue until groundwater achieves these standards both west and east of Route 125. Groundwater use restrictions will be maintained until these standards are achieved.
	Safe Drinking Water Act (42 U.S.C. §300f *et seq.*); National primary drinking water regulations (40 C.F.R.. 141, Subpart F)	Relevant and Appropriate for non-zero MCLGs only; MCLGs set as zero are To Be Considered.	Establishes maximum contaminant level goals (MCLGs) for public water supplies. MCLGs are health goals for drinking water sources. These unenforceable health goals are available for a number of organic and inorganic compounds.	Site groundwater is considered a potential drinking water source, and there are private wells downgradient of the plume. Non-zero MCLGs are relevant and appropriate. MCLGs set at zero are to be considered. The in-situ chemical oxdiation remedy will be designed and implemented to meet this requirement. Long-term monitoring will be performed to establish that residual source area remediation and remediation of the plume west of Route 125 results in a trend towards attainment of these standards over time, both west and east of Route 125. Groundwater use restrictions will be maintained until these standards are achieved.
Federal Criteria, Advisories, and Guidance	EPA Risk Reference Dose (RfDs)	To Be Considered	RfDs are considered to be the levels unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	Hazards due to noncarcinogens with EPA RfDs are used to evaluate exposures to contaminated groundwater. The in-situ chemical oxidation remedy will reduce contaminant levels so that they no longer pose a risk under these standards. Groundwater use restrictions will be maintained until these standards are achieved.

TABLE B-3a. CHEMICAL-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE SELECTED REMEDY ALTERNATIVE GW-2: IN SITU CHEMICAL OXIDATION

Authority	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain ARAR
	EPA Carcinogenicity Slope Factor	To Be Considered	Slope factors are developed by EPA from Health Effects Assessments and present the most up-to-date information on cancer risk potency. Slope factors are developed by EPA from Health Effects Assessments by the Carcinogenic Assessment Group.	Risks due to carcinogens as assessed with slope factors are used to evaluate exposures to contaminated groundwater. The in-situ chemical oxidation remedy will reduce contaminant levels so that they no longer pose a risk under these standards. Groundwater use restrictions will be maintained until these standards are achieved.
	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	Risks due to carcinogens are assessed using these guidelines. These standards are used to develop target cleanup levels. The in-situ chemical oxidation will reduce contaminant levels so that they no longer pose a risk under these standards. Groundwater use restrictions will be maintained until these standards are achieved.
	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	Risks to children due to carcinogens are assessed using these guidelines. These standards are used to develop target cleanup levels. The in-situ chemical oxidation will reduce contaminant levels so that they no longer pose a risk under these standards. Groundwater use restrictions will be maintained until these standards are achieved.
	Health Advisories (EPA Office of Drinking Water)	To Be Considered	Health Advisories are estimates of risk due to consumption of contaminated drinking water; they consider non-carcinogenic effects only. To be considered for contaminants in groundwater that may be used for drinking water where the standard is more conservative than either federal or state statutory or regulatory standards. The Health Advisory standard for manganese is 300 ppb.	Health advisories will be used to evaluate the non-carcinogenic risk resulting from exposure to certain compounds (e.g., manganese). The in-situ chemical oxidation remedy will be designed to ultimately reduce contaminant levels in groundwater used for drinking water to levels that do not exceed advisory levels. Groundwater use restrictions will be maintained until these standards are achieved.
State Requirements	Drinking Water Quality Standards: NH Admin. Code Env-Ws 314 MCLs and MCLGs for Inorganics; NH Admin. Code Env-Ws 315 MCLs and MCLGs for Regulated Organics	Relevant and Appropriate for MCLs and non-zero MCLGs only; MCLGs set as zero are To Be Considered.	State MCLs and MCLGs-establish maximum contaminant levels permitted in public water supplies and are the basis of State Ambient Groundwater Quality Standards (AGQS) that are applicable to site ground water. The regulations are generally equivalent to the Federal Safe Drinking Water Act (SDWA).	Site groundwater is considered a potential drinking water source, and there are private wells downgradient of the plume. Non-zero MCLGs are relevant and appropriate. MCLGs set at zero are to be considered. The in-situ chemical oxdiation remedy will be designed and implemented to meet this requirement. Long-term monitoring will be performed to establish that residual source area remediation and remediation of the plume west of Route 125 results in a trend towards attainment of these standards over time, both west and east of Route 125.

TABLE B-3a. CHEMICAL-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE SELECTED REMEDY ALTERNATIVE GW-2: IN SITU CHEMICAL OXIDATION

Authority	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain ARAR
	New Hampshire Ambient Groundwater Quality Standards (NH AGQS) (Env-Or 603.03, Table 600-1).	Relevant and Appropriate	Establishes maximum concentration levels for regulated contaminants in groundwater which result from human operations or activities. NH AGQS are equivalent to MCLs for contaminants that have MCLs. NH AGQS have been established for site groundwater contaminants for which no MCLs are established, and are derived to be protective for drinking water uses. The NH AGQS will be used for site contaminants where MCLs are not currently established.	The in-situ chemical oxidation remedy will be designed and implemented to meet the NH AGQS. Long-term monitoring will be performed to demonstrate that these standards are achieved over time.
	Nondegradation of Groundwater to Protect Surface Water: NH Admin. Code Env-Or 603.01 (c)	Applicable	Wm-Or 603.01(c) provides that, unless naturally occurring, groundwater shall not contain any contaminants at concentrations such that groundwater to surface water results in a violation of surface water standards in any surface water body within or adjacent to the site. Env-Or 603.01 (c) therefore incorporates surface water standards set forth at Env-Ws 1700.	Groundwater must be remediated by in-situ chemical oxidation to ensure nondegredation of surface water and wetlands. Groundwater will be treated to a level where it will not cause any degradation to surface water or wetlands so as to violate surface water quality standards.
	Soil Remediation Criteria, Env-Or 606.19	Applicable	Numeric soil remediation standards for organic and inorganic contaminants are established, with a provision for development of risk-based site-specific soil remediation standards.	The in-situ chemical oxidation alternative may remove contaminants from soils below the water table and in inaccessible areas under Route 125. At the successful conclusion of the groundwater remedy there will be an assessment as to whether these standards have been achieved.
	New Hampshire Department of Environmental Services Risk Characterization and Management Policy (Section 7.4(5)), April 2007	To be Considered	Establishes GW-1 and GW-2 guidelines for contaminants in groundwater. GW-1 values are equal to the NH AGQS values for ambient groundwater. GW-2 values are based on a subsurface vapor intrusion into buildings to calculate indoor air conservative risk assessments, and therefore apply to volatile contaminants only.	Private drinking water wells are located downgradient of the Site plume and are routinely monitored by NHDES. There are currently no structures on the State-owned property, where VOC concentrations in groundwater are most elevated and could pose a concern for vapor intrusion if stuctures were present. The in-situ chemical oxidation remedy will be designed and implemented to meet the GW-1 and GW-2 guidelines. If structures are planned for the State-owned property before remediation is complete, evaluation of the potential for vapor intrusion will be performed.

TABLE B-3b. LOCATION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE SELECTED REMEDY ALTERNATIVE GW-2: IN SITU CHEMICAL OXIDATION

Authority	Requirements	Status	Requirement Synopsis	Action To Be Taken To Attain ARAR
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C.. §661 *et seq*.); Fish and Wildlife Protection (40 C.F.R. §6.302(g))	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate, or compensate for losses of fish and wildlife.	Wetlands and surface water bodies (North and South Brooks, Country Pond) are in close proximity to the State-owned property where the in situ chemical oxidation system will be installed and operated for remediation of Site groundwater. There may be some negative effects from disturbance from the installation of new monitoring wells. These actions are anticipated to have some limited impacts to these resource areas. Planning and decision-making will incorporate fish and wildlife protection considerations in consultation with the resource agencies.
	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. Under this requirement, no activity that adversely affects a federal jurisdictional wetland shall be permitted if a practicable alternative with lesser effects is available. Action to avoid, whenever possible, the long- and short-term impacts on wetlands and to preserve and enhance wetlands.	Wetlands are in close proximity to the residual source areas west of Route 125 where the in-situ chemical oxidation wells will be installed. New monitoring wells may need to be installed in the wetlands east of Route 125 for long term monitoring of the plume. Wetlands disturbed by well installation, maintenance, monitoring, or other remedial activities will be mitigated in accordance with requirements. In-situ chemical oxidation east of Route 125 is not being considered for remediation of the extended plume because of the potential for detrimental effects to the wetlands.
	Clean Water Act, Section 404 (33 U.S.C.. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	Under this requirement, no activity that adversely affects a federal jurisdictional wetland shall be permitted if a practicable alternative with lesser effects is available. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Well installation, maintenance, and monitoring activities that require activity in the wetlands will be implemented to meet these requirements. Public comment was solicited in the Proposed Plan as to EPA's determination this alternative is the least damaging practicable alternative to protect wetland resources both on-site and downstream. There was no public opposition to this finding.

TABLE B-3b. LOCATION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE SELECTED REMEDY ALTERNATIVE GW-2: IN SITU CHEMICAL OXIDATION

Authority	Requirements	Status	Requirement Synopsis	Action To Be Taken To Attain ARAR
	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. Action to avoid, whenever possible, the long- and short-term impacts associated with the occupancy and modifications of floodplains development, wherever there is a practical alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	Portions of the wetlands east of Route 125 are within the 100-year floodplain. The site west of Route 125 is not shown to be in a floodplain, based on the FEMA map of the area. Remedial actions that involve construction in the floodplain areas, other than the potential installation of additional monitoring wells, are not anticipated. If such actions are later found to be necessary, the remedial design will include all practicable means to minimize harm to and preserve beneficial values of the floodplains. Floodplains disturbed by remedial actions will be restored to their original conditions and utility.
State Requirements	Criteria and Conditions for Fill and Dredge In Wetlands: RSA Ch. 482-A and NH Admin. Code Env-Wt Parts 300-400, 600, and 700	Applicable	These standards regulate filling and other activities in or adjacent to wetlands, and establish criteria for the protection of wetlands from adverse impacts on fish, wildlife, commerce, and public recreation.	Well installation, maintenance, and monitoring activities that require activity in the wetlands (Country Pond Marsh and wetlands west of Route 125) will be implemented to meet these requirements.

TABLE B-3b. LOCATION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE SELECTED REMEDY
ALTERNATIVE GW-2: IN SITU CHEMICAL OXIDATION

Authority	Requirements	Status	Requirement Synopsis	Action To Be Taken To Attain ARAR
	Terrain alteration adjacent to surface waters; Env-Ws 415 and RSA 485-A:17	Relevant and Appropriate	The purpose of these rules is to protect surface water quality from degradation resulting from any activity which significantly alters terrain or occurs in or on the border of the surface waters of the state. The permanent methods for protecting water quality decribed include: vegetated filter strips, grassed swales, detention ponds, wet ponds, constructed wetlands, infiltration trenches, infiltration basins and water quality inlets.	Activities performed in association with the implementation of this alternative (e.g. installation and operation of monitoring and injection well systems) will be compliant with these standards and would result in the least adverse impact to surface waters/wetlands. Engineering controls (e.g. siltation controls, erosion controls) would be implemented during remedial activities to minimize harm to surface waters/wetlands. Excavated material, including well drillings, would be stockpiled and dewatered outside of wetland areas prior to off-Site disposal. Wetlands would be restored (using suitable soil and vegetation) where altered temporarily by the remedy.

TABLE B-3c. ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE SELECTED REMEDY
ALTERNATIVE GW-2: IN SITU CHEMICAL OXIDATION

Authority	Requirement	Status	Triggering Action and Requirement Synopsis	Action to be taken to attain ARAR
Federal Requirements	Resource Conservation and Recovery Act (RCRA), 42 U.S.C.. §§ 6901 *et seq.,* Standards for identification and listing of hazardous waste, 40 C.F.R. Part 261	Applicable	New Hampshire has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations (Env-Wm 400). These provisions have been adopted by the State.	Any wastes generated by remedial activity will be analyzed by appropriate test methods. If found to be hazardous wastes, then they will be managed in accordance with the substantive requirements of the State hazardous waste regulations. Wastes that may be generated include: investigation derived waste from well installation and development activities, and unused oxidant chemicals.
	RCRA, Standards applicable to generators of hazardous wastes, 40 C.F.R. Part 262	Applicable	New Hampshire has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations (Env-Wm 500). These provisions have been adopted by the State.	If remedial activity generates hazardous wastes, then they will be managed in accordance with the substantive requirements of the State hazardous waste regulations.
	RCRA, Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities, 40 C.F.R. Part 264	Applicable	New Hampshire has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations (Env-Wm 700).	If the in-situ chemical oxidation system meets regulatory standards to be a hazardous waste facility it will be operated, maintained and eventually closed in compliance with the substantive requirements of the State hazardous waste regulations.
	Clean Air Act (CAA), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 42 U.S.C. § 112(b)(1), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	Any remedial activities on the site, particularly disturbance of contaminated areas that may generate dust and which may release any of the listed air pollutants, will meet these standards. Dust control will be required during the installation of the monitoring and injection well systems.
	Clean Water Act (CWA), Section 402, 33 U.S.C. § 1342; 40 C.F.R.. 122-124, 131, 136 - Discharge of Pollutants	Applicable	These standards address water discharges which may be directed to surface water.	If a discharge from the remedial action is directed to surface water the discharge will be treated, if necessary, so that these standards will be achieved. No direct discharges to surface water are anticipated under this alternative. Oxidants will be injected into the subsurface (saturated zone) and monitoring will be performed to determine whether injected oxidants could potentially affect nearby surface water bodies, in accordance with Env-Or-607 (see below).

TABLE B-3c. ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE SELECTED REMEDY
ALTERNATIVE GW-2: IN SITU CHEMICAL OXIDATION

Authority	Requirement	Status	Triggering Action and Requirement Synopsis	Action to be taken to attain ARAR
	CWA, Ambient Water Quality Criteria (AWQC), 40 C.F.R. 122.44	Relevant and Appropriate	These regulations establish water quality standards for protection of human health and aquatic life.	Used to establish monitoring standards for surface waters and sediments. Surface water and sediment will be monitored annually to determine whether this alternative is effective in reducing VOC and 1,4-dioxane contaminant migration to the wetland east of Route 125, and that oxidant injections do not cause detrimental impacts.
	Underground Injection Control, 40 C.F.R.. 144, 146, 147	Relevant and Appropriate	Establishes protective standards for discharges to groundwater. The federal UIC program designates injection wells incidental to aquifer remediation and experimental technologies as Class V wells authorized by rule. State requirements apply in this case; see Env-WS 384 below.	Injection of oxidants to treat contaminated groundwater will be carried out so that groundwater resources are protected.
State Requirements	Contaminated Site Management, NH Admin. Code Env-Or 600 : Part 607, Groundwater Management Permits; Part 608, Activity and Use Restrictions; Part 610, Monitoring; Part 611, Contaminated Soils	Applicable	Env-Or Part 607 provides for establishment of Groundwater Management Zones (GMZ) to control use of groundwater that exceeds AGQS, requires monitoring of the groundwater quality within the GMZ, requires implementation of measures to restore the groundwater quality, and requires an evaluation of the effectiveness of the measures. Part 608 establishes standards for setting institutional controls to protect human health and components of the remedy. Part 610 establishes standards for monitoring groundwater, including requirements and criteria for constructing, developing, and decommissioning monitoring wells. Part 611 establishes standards for managing contaminated soils.	A GMZ will be established for the residual source area plumes (those plumes within the State-owned property boundaries) and will remain in place until cleanup goals have been attained throughout the GMZ. For plumes that are outside the boundary of the State-owned property (plumes north of the State-owned property and east of Route 125), GMZ will also be established and will remain in place until remediation of the residual source area plumes has progressed sufficiently, such that AGQS are met in the northern and eastern plumes as well as within the State-owned property boundaries. Note that even when compliance with these standards is acheived, groundwater use restrictions may still be required for the remedy if there are more stringent federal compliance standards (see Table 2-5) that still have not been acheived. Injection of oxidants into the groundwater will comply with the substantive requirements of Part 607, including controlling use of groundwater within the GMZ, and monitoring and reporting requirements to evaluate the [see next page for continuation]

TABLE B-3c. ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE SELECTED REMEDY
ALTERNATIVE GW-2: IN SITU CHEMICAL OXIDATION

Authority	Requirement	Status	Triggering Action and Requirement Synopsis	Action to be taken to attain ARAR
				effectiveness of the remedial action and possible effects of the oxidants and oxidant byproducts. Activity and use restrictions will be established to prevent human exposure to contaminated groundwater and protect components of the remedy. Groundwater monitoring will be required until State ground water standards are acheived throughout the GMZ (monitoring will be continued if additional Federal groundwater standards still need to be acheived). Groundwater monitoring wells will be installed, operated, and decommissioned under these standards. Contaminated soils generated from installation of wells and any other remedial activity will be managed in compliance with these standards.
	Identification and Listing of Hazardous Wastes, N.H.. Admin. Code Env-Wm 400, Toxicity Characteristic	Applicable	These standards list particular hazardous wastes and identify the maximum concentration of contaminants for which the waste would be a RCRA characteristic waste. The analytical test set out in Appendix II of 40 C.F.R.. Part 261 is referred to as the Toxicity Characteristic Leaching Procedure (TCLP). The federal *requirements 40 C.F.R. Part 261 are* incorporated by reference.	Any wastes generated by remedial activity will be analyzed to determine whether they are listed or characteristic hazardous waste under these standards. Materials that are listed waste or exceed TCLP hazardous waste thresholds will be disposed off-site in a RCRA Subtitle C facility. Depending on the type of oxidant used, there is potential for unused oxidant to require disposal as a RCRA hazardous *waste, if it is not acceptable for return to the supplier for* resale. Non-hazardous materials will be disposed appropriately.
	Requirements for Hazardous Waste Generators, N.H.. Admin. Code Env-Wm 500 [formerly He-P Ch. 1905.06]: including Part 507 Storage Requirements; Part 513 Emergency/Remedial Actions	Applicable	Requires determination as to whether waste materials are hazardous and, if so, requirements for managing such materials on site prior to shipment off site. The federal requirements 40 C.F.R. Part 262 are incorporated by reference.	If remedial activity generates hazardous wastes, then they will be managed in accordance with the substantive requirements of these regulations prior to off-site shipment.

TABLE B-3c. ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE SELECTED REMEDY
ALTERNATIVE GW-2: IN SITU CHEMICAL OXIDATION

Authority	Requirement	Status	Triggering Action and Requirement Synopsis	Action to be taken to attain ARAR
	Requirements for Owners and Operators of Hazardous Waste Facilities/Hazardous Waste Transfer Facilities, N.H.. Admin. Code Env-Wm 700 [formerly He-P Ch. 1905.08]: including § 702.10 Groundwater Monitoring; § 702.11, Other Monitoring; Part 706, Emergency/Remedial Actions; Part 708, Facility Standards	Applicable	This regulation establishes requirements for owners or operators of hazardous waste sites. Part 708 incorporates by reference the federal requirements under 40 C.F.R. Part 264, including but not limited to Subpart G (closure/post closure), Subpart I (containers), Subpart J (tanks)	If the in-situ chemical oxidation system meets regulatory standards to be a hazardous waste facility it will be operated, maintained and eventually closed in compliance with these standards.
	Rules Governing the Control of Air Pollution, RSA Ch. 125-C, Air Pollution Control; NH Admin. Code Env-A 100-4300	Applicable	These provisions establish standards for the release of air emissions, including VOCs and hazardous air pollutants. Applicable standards include the most stringent of the following requirements: (1) New Source Performance Standards, (40 C.F.R. Part 60); (2) National Emissions Standards for Hazardous Air Pollutants (40 C.F.R. Part 61); and (3) New Hampshire State Implementation Plan limits. See RSA 125-C:6.	As envisioned in the FS, the ISCO alternative is targeting the saturated zone soil/groundwater and will not generate VOC emissions to air. Certain types of oxidants (e.g., ozone, which is a gas, and Fenton's reagent, which can generate oxygen and heat) contain the potential for fugitive air emissions. If an oxidant or combination of oxidants is selected that could cause release of VOCs from groundwater to the unsaturated zone, emissions controls (such as soil vapor extraction points) will be included in the remedial design to control emissions.
	Ambient Air Quality Standards, NH Admin. Code Env-A 300	Applicable	These regulations set primary and secondary ambient air quality standards (equivalent to federal standards). The standards do not allow significant deterioration of existing air quality in any portion of the state for: particulate matter, sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone hydrocarbons and lead.	If there are remedial processes that result in releases of contaminants into the air, air quality standards will be complied with during remedial activities. See above.
	Fugitive Dust, N.H.. Admin. Code Env-A Part 1002	Applicable	Requires precautions to prevent, abate and control fugitive dust during specified activities, including excavation and construction.	Precautions to control fugitive dust emissions will be required during site remediation activities that could generate dust, such as monitoring well installation.

TABLE B-3c. ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE SELECTED REMEDY
ALTERNATIVE GW-2: IN SITU CHEMICAL OXIDATION

Authority	Requirement	Status	Triggering Action and Requirement Synopsis	Action to be taken to attain ARAR
	Regulated Toxic Air Pollutants, NH Admin. Code Env-A Part 1400	Applicable	This regulation identifies toxic air pollutants to be regulated. These pollutants are also listed by EPA in 40 CFR 261. High, moderate and low Toxicity Classifications are established. Air toxics in these classifications are regulated when they occur in concentrations that cause adverse health effects including increased cancer risk.	If there are remedial processes that result in releases of contaminants into the air, air quality standards will be complied with during remedial activities. See above.
	Surface Water Quality Regulations, NH Admin. Code Env-Ws 1700	Applicable	These rules establish water quality standards for the state's surface waters. Water quality criteria for toxic substances are established. [See Part Env-Ws 1703 Water Quality Standards and Env-Ws 1704 Alternative Site Specific Criteria]. These rules are applicable to point or non-point discharge(s) of pollutants to surface waters.	No direct discharges to surface water are anticipated under the ISCO alternative. Standards will be used for monitoring to measure the performance and effectiveness of the remedial action in preventing contaminated groundwater from degrading nearby surface waters.
	Interim Criteria for Groundwater Discharges: NH Admin. Code Env-Ws 1500	Applicable	These regulations establish substantive requirements for discharges to ground water, including prohibited discharges (Env-Ws 1503,04), compliance criteria (Env-Ws 1504.03), and water quality sampling (Env-Ws 1507.01).	Under this alternative, oxidants will be injected within a Groundwater Management Zone and therefore the injections are exempt from the groundwater quality criteria in Env-Ws 1503.03, and Env-Or 600 Part 607 (Groundwater Management Permits) is the governing rule. Groundwater outside of the GMZ will be monitored to make that the injections are not causing exceedances of these standards.
	Underground Injection Control Requirements, Env-Ws 384	Relevant and Appropriate for Injection Wells	The purpose of these rules is to establish standards, criteria, and procedures for underground injection to wells to prevent pollution and protect groundwater as specified in 40 CFR 9, 144, 145, and 146.	If the discharge from a remedial action is directed to groundwater the discharge will be treated, if necessary, so that these standards will be achieved. Injection of oxidants to treat contaminated groundwater will be carried out so that groundwater resources are protected.
	Management of Contaminated Soil, NH Admin. Code Env-Or 611	Applicable	Establishes requirements for managing contaminated soils, including requirements for sampling and analysis of soil destined for off-site treatment or disposal, storage requirements for stockpiled soil, and disposal requirements.	Any remedial activities on the site that generates and stockpiles contaminated soil requiring on-site management or off-site disposal will comply with these requirements. Minimal soil generation is anticipated from the installation of injection wells and monitoring wells. Chemical oxidants may be mixed directly into contaminated soils in Area B.

TABLE B-3c. ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE SELECTED REMEDY ALTERNATIVE GW-2: IN SITU CHEMICAL OXIDATION

Authority	Requirement	Status	Triggering Action and Requirement Synopsis	Action to be taken to attain ARAR
	Standards for Construction, Maintenance and Abandonment of Wells, NH Admin. Code Env-We 600	Applicable	This provision requires that wells be constructed, maintained, relocated, and/or abandoned according to these regulations.	Wells used for the remedy will be created, operated, and closed in compliance with these standards.

Table B-4
Alternative GW-2 Cost Estimate: In-situ Chemical Oxidation
Ottati & Goss
Period of Performance: 5 years for ISCO, 30 years for Long-term Monitoring

Field Task 1 - Capital Costs	Number	Unit	Unit Cost (8)	Total Cost (8)
Pilot Test (Area A, Area B, Northern Plume)				
Install Test Wells (3 triplet nested wells)	1	ls	$16,000	$16,000
Install Monitoring Wells (3 triplet nested wells)	1	ls	$15,000	$15,000
Field and laboratory Testing	1	ls	$60,000	$60,000
Oversight	18	days	$1,000	$18,000
				$109,000
Install Injection Wells (312 Wells) [1]	1	ls	$323,000	$323,000
Mobilization/Site Clearing & Prep	1	ls	$6,000	$6,000
SUBTOTAL				$329,000
Install Monitoring Wells (75 Wells) [2]	1	ls	$86,000	$86,000
Mobilization	1	ls	$2,000	$2,000
SUBTOTAL				$88,000
TOTAL				**$526,000**
Project Management/Oversight [3]	8%			$42,000
Design (Construction) [3]	15%			$79,000
Construction Management (drilling oversight) [3]	160	days	$1,000	$160,000
SUBTOTAL				$807,000
30% Contingency				$242,000
TOTAL CAPITAL COST				**$1,049,000**

Task 2 - Treatment/Periodic Costs	Number	Unit	Unit Cost	Total Cost
Year 0				
Baseline ISCO monitoring plus site-wide monitoring	1	ls	$196,000	**$196,000**
Year 1				
Oxidant Injection Round 1 [4]	1	ls	$430,000	$430,000
Procurement/staging	1	ls	$3,000	$3,000
Process Monitoring (75 wells, 2X per year)	1	ls	$389,000	$389,000
Annual Site Wide Monitoring (30 wells, 2 SW, 2 sediment, 2X per yr)	1	ls	$150,000	$150,000
Project Management (8%)	1	ls	$77,760	$78,000
Contingency (30%)				$315,000
Total Year 1				**$1,365,000**
Year 2				
Oxidant Injection Round 2 (injection in 75% of the wells)	1	ls	$331,000	$331,000
Procurement/staging	1	ls	$3,000	$3,000
Process Monitoring (75 wells, 2X per year)	1	ls	$389,000	$389,000
Annual Site Wide Monitoring (30 wells, 2 SW, 2 sediment, 2X per yr)	1	ls	$150,000	$150,000
Project Management (8%)	1	ls	$69,840	$70,000
Contingency (30%)				$283,000
Total Year 2				**$1,226,000**
Year 3				
Oxidant Injection Round 3 (injection in 56% of the wells)	1	ls	$256,000	$256,000
Procurement/staging	1	ls	$3,000	$3,000
Process Monitoring (75 wells, 2X per year)	1	ls	$389,000	$389,000
Annual Site Wide Monitoring (30 wells, 2 SW, 2 sediment, 2X per yr)	1	ls	$150,000	$150,000
Project Management (8%)	1	ls	$63,840	$64,000
Contingency (30%)				$259,000
Total Year 3				**$1,121,000**
Year 4				
Process Monitoring (75 wells, 1X per year)	1	ls	$196,000	$196,000
Annual Site Wide Monitoring (30 wells, 2 SW, 2 sediment, 2X per yr)	1	ls	$150,000	$150,000
Project Management (8%)	1	ls	$27,680	$28,000
Contingency (30%)				$112,000
Total Year 4				**$486,000**

Table B-4
Alternative GW-2 Cost Estimate: In-situ Chemical Oxidation
Ottati & Goss
Period of Performance: 5 years for ISCO, 30 years for Long-term Monitoring

Year 5				
Closeout Report	1	ls	$15,000	$15,000
Injection well abandonment (228 well locations) [5]	228	ea	$500	$114,000
Annual Site Wide Monitoring (30 wells, 2 SW, 2 sediment, 2X per yr)	1	ls	$150,000	$150,000
Project Management (8%)	1	ls	$13,240	$13,000
Contingency (30%)				$88,000
Total Year 5				**$380,000**
Annual Monitoring Years 6 through 30				
Annual Site Wide Monitoring (15 wells, 2 SW, 2 sediment 2X per yr)	25	ls	$86,000	$2,150,000
Project Management (10%)	25	ls	$8,600	$215,000
Contingency (30%)				$710,000
Total Annual Monitoring (Years 6-30)				**$3,075,000**
Periodic Review Reports				
Five Year Review (Years 5, 10, 15, 20, 25, and 30)	6	LS	$25,000	$150,000
Project Management (10%)	6	LS	$2,500	$15,000
Contingency (30%)				$50,000
Total Periodic Review Reports				**$215,000**
Closeout Report				
Closeout Report (Year 30)	1	LS	$15,000	$15,000
Project Management (10%)	1	LS	$1,500	$2,000
Contingency (30%)				$5,000
Closeout Report Total				$22,000
Monitoring Well Abandonment				
Monitoring Well Abandonment (Year 30) [5]	175	EA	$500	$88,000
Project Management (4%)	1	LS	$3,520	$4,000
Contingency (30%)				$27,000
Monitoring Well Abandonment Total				$119,000

Present Value:	**Total Cost**	**Cost per Year**	**Present Value [6]**	**Inflation Value [7]**
Capital Cost	$1,049,000	$1,049,000	$1,049,000	$1,049,000
Baseline monitoring	$196,000	$196,000	$196,000	$196,000
Treatment Year 1	$1,365,000	$1,365,000	$1,276,000	$1,413,000
Treatment Year 2	$1,226,000	$1,226,000	$1,070,000	$1,313,000
Treatment Year 3	$1,121,000	$1,121,000	$915,000	$1,243,000
Year 4	$486,000	$486,000	$371,000	$558,000
Year 5	$380,000	$380,000	$271,000	$451,000
Long Term Monitoring (Years 6-30)	$3,075,000	$123,000	$1,022,000	$5,889,000
Periodic Review Reports (Years 5, 10, 15, 20, 25, 30)	$215,000	$36,000	$78,000	$412,000
Closeout Report	$22,000	$22,000	$3,000	$62,000
Monitoring Well Abandonment	$119,000	$119,000	$16,000	$334,000
Total Treatment/Periodic Costs			***$5,218,000***	***$11,871,000***
TOTAL FOR ALTERNATIVE			**$6,267,000**	**$12,920,000**

TOTAL PRESENT VALUE FOR ALTERNATIVE [8]	**$6,267,000**
TOTAL FUTURE COST W/ INFLATION FOR ALTERNATIVE [8]	**$12,920,000**

Notes:

(1) Injection wells are 1-inch diameter wells. Costs based on unit prices for similar projects. It is assumed that pilot test wells will be used during full-scale treatment.

(2) Monitoring wells are 2-inch diameter wells. Includes 65 ISCO area wells and 10 new site-wide wells. Costs are based on unit prices for similar projects.

(3) Percentages of capital costs, based on projects $2M-$10M (EPA, 2000)

(4) A total of three injections over a three year period have been assumed with all wells injected in year 1, into 75% of the wells in year 2 and 56% of wells in year 3

(5) Cost is based on abandonment of 35-foot deep wells. For injection well abandonment, it is assumed that nested wells can be abandoned as one well.

(6) The discount factor equals 7 0%

(7) The inflation rate equals 3.5%

(8) All costs are rounded to the nearest $1,000

Table B-5
Alternative GW-3 Cost Estimate: Groundwater Extraction and Treatment [1]
Ottati & Goss
Period of Performance: 10 Years (all areas) plus an additional 20 Years for Area B Only

Field Task 1 - Construction of Remedy Components	Number	Unit	Unit Cost	Total Cost
Treatment Plant Building [2]				
Building (site prep, foundation, HVAC, plumbing, electrical)	1	LS	$1,230,000	$1,230,000
Mobilization	1	LS	$10,000	$10,000
SUBTOTAL				$1,240,000
Extraction/Collection System [2]				
Mobilization	1	LS	$4,500	$4,500
Extraction Wells (install, materials, development, pumps, decon)	6	EA	$17,600	$105,600
Piping to Plant in Trenches with crushed stone bottom	970	LF	$60	$58,200
SUBTOTAL				$168,300
Treatment Processes [2]				
Equalization Tank (3,000G)	1	EA	$6,900	$6,900
Flash Mix / Flocculation Tank (1,000G)	1	EA	$3,800	$3,800
Inclined Plate Clarifier	1	EA	$124,000	$124,000
Filter Feed Tank (1,000G)	1	EA	$3,800	$3,800
Dual Media Pressure Filters (3 GPM/ SQ FT)	1	EA	$113,000	$113,000
Spent Backwash Holding Tank (10,000G)	1	EA	$16,000	$16,000
Sludge Thickener (15,000 G)	1	EA	$20,000	$20,000
Sludge Holding Tank (10,000G)	1	EA	$15,000	$15,000
Filter Press (25 CF)	1	EA	$144,000	$144,000
Filtrate/Decant Tank (10,000G)	1	EA	$15,000	$15,000
Chemical Feed System	1	EA	$6,200	$6,200
Advanced Oxidation Unit	1	EA	$247,000	$247,000
Liquid Phase Carbon Unit	1	EA	$11,000	$11,000
Vapor Phase Carbon Units (1200 lb)	1	EA	$11,000	$11,000
Effluent Holding Tank (10,000 G)	1	EA	$15,000	$15,000
Mixers, pumps, air compressor, blower	1	LS	$181,000	$181,000
SUBTOTAL				$932,700
Recharge Trenches [2]				
Mobilization	1	LS	$4,500	$4,500
Trenches (excavate, crushed stone, perforated pipe, sand, backfill	2	EA	$38,000	$76,000
Piping to Recharge Trenches to Plant	230	LF	$60	$13,800
SUBTOTAL				$94,300
Instrumentation Allowance [3]	17%			$158,232
Process Pipe Allowance [3]	15%			$139,616
Initial Start Up [3]	5%			$46,539
TOTAL				$2,779,687
30% Contingency				$833,906
Project Management/Oversight [4]	5%			$180,680
Remedial Design [4]	8%			$289,087
Construction Management [4]	6%			$216,816
TOTAL PUMP AND TREAT SYSTEM COSTS				*$4,300,000*
New Monitoring Wells				
Mobilization	1	LS	$1,000	$1,000
Install 10 new monitoring wells [5]	10	EA	$2,200	$22,000
Project Management (10%)	1	LS	$2,300	$2,300
Contingency (30%)				$7,590
SUBTOTAL				$32,890
TOTAL CAPITAL COST				**$4,333,000**

Table B-5
Alternative GW-3 Cost Estimate: Groundwater Extraction and Treatment [1]
Ottati & Goss
Period of Performance: 10 Years (all areas) plus an additional 20 Years for Area B Only

Task 2 - Annual Operations & Maintenance (O&M)	Number	Unit	Unit Cost	Total Cost
Treatment and Building O&M, Years 1 to 10 [6]	1	LS	$237,000	$237,000
Sludge Handling Total, Years 1 to 10 [6,7]	1	LS	$137,000	$137,000
Chemical Total, Years 1 to 10 [6]	1	LS	$32,000	$32,000
Performance Monitoring, Years 1 to 10 [6,8]				
Influent/Effluent Sample Analysis	1	LS	$42,000	$42,000
Extraction Well Sample Analysis	1	LS	$26,000	$26,000
				$68,000
TOTAL				$474,000
O&M Technical Support, Years 1 to 10	15%			$71,100
TOTAL ANNUAL TREATMENT SYSTEM O&M, Years 1 to 10				**$545,000**
Treatment and Building O&M, Years 11 to 30 [6]	1	LS	$198,000	$198,000
Sludge Handling Total, Years 11 to 30 [6,7]	1	LS	$17,000	$17,000
Chemical Total, Years 11 to 30 [6]	1	LS	$3,000	$3,000
Performance Monitoring, Years 11 to 30 [6,8]				
Influent/Effluent Sample Analysis	1	LS	$42,000	$42,000
Extraction Well Sample Analysis	1	LS	$15,000	$15,000
				$57,000
TOTAL				$275,000
O&M Technical Support, Years 11 to 30	15%			$41,250
TOTAL ANNUAL TREATMENT SYSTEM O&M, Years 11 to 30				**$316,000**

Task 3 - Periodic Costs	Number	Unit	Unit Cost	Total Cost
Long-Term Monitoring [9]				
YEARS 1 - 5: 30 groundwater wells sampled 2 times per year, 2 sediment and 2 surface water locations one time per year				
Annual Long-Term Monitoring (Years 1 - 5)	1	LS	$150,000	$150,000
Project Management (8%)	1	LS	$12,000	$12,000
Contingency (30%)				$48,600
Total Long-Term Monitoring (Years 1 - 5)				$210,600
YEARS 6 - 30: 15 groundwater wells sampled 2 times per year, 2 sediment and 2 surface water locations one time per year				
Annual Long-Term Monitoring (Years 6 - 30)	1	LS	$86,000	$86,000
Project Management (10%)	1	LS	$8,600	$8,600
Contingency (30%)				$28,380
Total Long-Term Monitoring (Years 6 - 30)				$122,980
Periodic Review Reports				
Five Year Review (Years 5, 10, 15, 20, 25, and 30) [5]	6	LS	$25,000	$150,000
Project Management (10%)	6	LS	$2,500	$15,000
Contingency (30%)				$49,500
Five Year Review Total				$214,500
Remedy Completion Activities				
Closeout Report (Year 30) [5]	1	LS	$15,000	$15,000
Project Management (10%)	1	LS	$1,500	$1,500
Contingency (30%)				$4,950
Closeout Report Total				$21,450
Removal of Remedy Components (Year 30) [10]	1	LS	$139,905	$139,905
Project Management (4%)	1	LS	$5,596	$5,596
Contingency (30%)				$43,650
Removal of Remedy Components Total				$189,152
Monitoring Well Abandonment (Year 30) [11]	120	EA	$500	$60,000
Project Management (4%)	1	LS	$2,400	$2,400
Contingency (30%)				$18,720
Monitoring Well Abandonment Total				$81,120

Table B-5
Alternative GW-3 Cost Estimate: Groundwater Extraction and Treatment [1]
Ottati & Goss
Period of Performance: 10 Years (all areas) plus an additional 20 Years for Area B Only

Cost Summary:	Total Cost	Total Cost Per Year [13]	Present Value [14]	Inflation Value [15]
Capital Cost	$4,333,000		$4,333,000	$4,333,000
O&M and Periodic Year 1 [12]	$756,000	$756,000	$706,000	$782,000
O&M and Periodic Year 2 [12]	$756,000	$756,000	$660,000	$809,000
O&M and Periodic Year 3 [12]	$756,000	$756,000	$617,000	$838,000
O&M and Periodic Year 4 [12]	$756,000	$756,000	$576,000	$867,000
O&M and Periodic Year 5 [12]	$791,000	$791,000	$564,000	$940,000
O&M and Periodic Year 6 [12]	$668,000	$668,000	$445,000	$821,000
O&M and Periodic Years 7-10 [12]	$2,708,000	$677,000	$1,526,000	$3,633,000
O&M and Periodic Years 11-15 [12]	$2,231,000	$446,200	$928,000	$641,000
O&M and Periodic Years 16-20 [12]	$2,231,000	$446,200	$662,000	$4,153,000
O&M and Periodic Years 21-25 [12]	$2,231,000	$446,200	$472,000	$4,932,000
O&M and Periodic Years 26-30 [12]	$2,231,000	$446,200	$336,000	$5,858,000
Remedy Completion Activities at Year 30	$292,000	N/A	$0	$0
Total O&M and Periodic Costs for 30 Years			***$7,492,000***	***$24,274,000***
TOTAL FOR ALTERNATIVE - 30 YEARS			**$11,825,000**	**$28,607,000**
TOTAL PRESENT VALUE FOR ALTERNATIVE				**$11,825,000**
TOTAL INFLATION VALUE FOR ALTERNATIVE				**$28,607,000**

N/A - Not Applicable

(1) Values presented within this table are rounded

(2) See attached table of Pump and Treat Capital Costs

(3) Percentages of total treatment processes cost.

(4) Percentages of capital costs, based on projects $2M-$10M (EPA, 2000)

(5) Assumed cost based on experience

(6) See attached table of Pump and Treat Operations and Maintenance Costs

(7) See attached Pump and Treat Sludge Calculations

(8) See attached Pump and Treat Performance Sampling table

(9) See attached Long-Term Groundwater, Surface Water, and Sediment Monitoring Table

(10) Allowance, 15% of treatment equipment

(11) Cost is based on abandonment of 120 35-foot deep monitoring wells

(12) Periodic costs within the Cost Summary include long-term monitoring and periodic review reports only. Remedy completion costs are provided as a separate line item under the Cost Summary

(13) Total costs per year are normalized when the O&M and periodic costs span over more than one year

(14) Present Value is based on a 7% discount factor

(15) Inflation Value is based on a 3.5% inflation rate

APPENDIX C
STATE CONCURRENCE

The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner

September 20, 2007

James T. Owens, III, Director
Office of Site Remediation and Restoration
EPA - New England, Region I
1 Congress Street, Suite 1100
Boston, MA 02114-2023

SUBJECT: **Kingston** - Ottati & Goss/Great Lakes Container Corp Superfund Site, Route 125
CERCLIS ID # NHD990717647; DES Site # 199004006, Project RSN # 1866

Amended Record of Decision – Declaration of Concurrence (NLP Final 09/08/83)

Dear Mr. Owens:

The New Hampshire Department of Environmental Services (Department) has reviewed the Amended Record of Decision (AROD), dated September 2007, for the Ottati & Goss/Great Lakes Container Corporation Superfund Site (Site) in Kingston, New Hampshire. The United States Environmental Protection Agency (EPA) prepared the AROD in accordance with the provisions of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986. The AROD addresses the remedial actions necessary under CERCLA, as amended, to manage potential threats to human health and the environment at the Site.

Rational for the Amendment

In January 1987, EPA issued a Record of Decision for the Site which included a groundwater extraction and treatment system. Based on information and data generated since the issuance of the 1987 ROD and after the careful study of alternative groundwater cleanup technologies, the EPA believes that in-situ chemical oxidation (ISCO) is a better approach to cleaning the groundwater at the Site than the groundwater extraction and treatment system selected in the 1987 ROD. The information and data which supports a fundamental change to the groundwater component of the 1987 ROD is summarized in the Amended ROD (Part 2, Section III).

Overview of the Record of Decision

The cleanup alternative selected in the 1987 ROD consisted of:

- Excavating approximately 19,000 cubic yards of soil to be treated on Site using incineration and thermal aeration;
- Mitigation of groundwater contamination by extraction, treatment, and re-injection of the treated groundwater;
- Demolition and disposal of above-ground and below-ground structures including a building, utilities, and underground storage tanks;
- A soil cover;
- Long-term monitoring of the Site.

All of the cleanup activities required by the 1987 ROD and subsequent decision documents have been completed with the exception of the extraction and treatment of contaminated groundwater. As stated above, the EPA believes that in-situ chemical oxidation (ISCO) is a better approach to cleaning the groundwater at the Site than the groundwater extraction and treatment system selected in the 1987 ROD.

Overview of the Amended Record of Decision

The major components of EPA's new proposed cleanup plan include: in-situ chemical oxidation (ISCO); attenuation of the extended plume through natural processes; environmental monitoring and institutional controls. Each component is discussed below.

***In-Situ* Chemical Oxidation:** ISCO involves the injection of an oxidant directly into the groundwater to break down contaminants into non-hazardous by-products such as water, salt, and carbon dioxide. The goal for in-situ chemical oxidation is to achieve significant reduction of contaminant mass, with the intent of eventually achieving Federal and State drinking water standards in on-site groundwater with attenuation of the extended plume.

Several chemical oxidants are available for contaminant remediation, including: permanganate; persulfate; percarbonate; Fenton's Reagent and ozone. For this Site, an oxidant capable of oxidizing VOCs (including benzene, toluene, ethylbenzene, xylene and chlorinated ethenes), and 1,4-dioxane is required. Oxidants which have been demonstrated to oxidize these contaminants include ozone, Fenton's Reagent, and activated persulfate.

Oxidant delivery can be performed through semi-permanent wells, direct-push rods, or screened injection wells installed using a standard drill rig. Addition of an oxidant can also be conducted via soil blending using augers or excavator-mounted mixing equipment. Injection into permanent wells similar to standard groundwater monitoring wells is a readily implementable and commonly applied method. This method would allow for additional future injections with less drilling activity and allow additional data collection points. Soil blending may be considered for a portion of the Site to provide better contact in dense, low-permeable soils. However, caution would be required if soil blending were implemented in the proximity of the Route 125 embankment. A geotechnical analysis and consultation and coordination with the New Hampshire Department of Transportation would be required if this method of oxidant delivery is implemented. The oxidant delivery strategy will be finalized during remedial design.

Attenuation of the extended plume east of Route 125 will take additional time to occur once the source areas west of Route 125 are treated. It is assumed that monitoring of the extended plume would need to be performed for approximately 30 years.

Environmental Monitoring: Environmental monitoring would be performed from numerous existing and newly installed wells in order to evaluate the progress/success of the remedy. Monitoring of VOCs and 1,4-dioxane, as well as metals would be performed to assess contaminant destruction, determine progress towards attainment of remedial action objectives, and evaluate potential metals mobilization. Groundwater geochemical parameters, including: dissolved oxygen; pH; oxidation reduction potential; and conductivity, would also be monitored. Surface water and sediment samples would also be collected from Country Pond to monitor potential contaminant migration into the pond.

This alternative also includes continued monitoring of select residential wells on an annual basis, consistent with the annual residential well monitoring program that NHDES has been performing since 1992.

Institutional Controls: Institutional controls are administrative actions that minimize the potential for human exposure by restricting resource usage. Institutional controls would be implemented in the form of the establishment of deed restrictions and/or notices to establish a groundwater restriction area which would also be integrated into a State Groundwater Management Zone (GMZ) and a land-use restriction to prevent digging into contaminated substrates or disturbance of remedial components (including monitoring and injection wells) on the Site and on areas of abutting properties. Institutional controls would also include a requirement to evaluate the vapor intrusion pathway within the GMZ should any structures be contemplated within the groundwater restriction area. The GMZ would be retained until the established Site groundwater cleanup goals are met.

Justification for the Selected Remedy

The Department believes that the proposed alternative groundwater remedy will be as protective as the 1987 ROD remedy, will offer greater flexibility in addressing the groundwater contamination at the site and be less expensive.

The selected remedy provides a permanent solution for the contaminated groundwater at the Site. The injection of an oxidant into the contaminated groundwater will permanently destroy or reduce the contamination to safe levels. The selected remedy will reduce human health risk levels such that they do not exceed EPA's acceptable risk range of 10^{-4} to 10^{-6} or New Hampshire's target risk goal of 10^{-5}, for incremental carcinogenic risk and such that the non-carcinogenic hazard is below a level of concern and will not exceed a hazard index of one.

There are no significant short-term risks to human health or the environment anticipated during implementation of the selected remedy. The potential exposure of Site workers and area residents to contaminants will be minimized by using health and safety plans that include air monitoring to assess potential releases to the air during cleanup operations.

The selected remedy is expected to reduce and eventually eliminate any potential future groundwater risks posed by the Site. Furthermore, the selected remedy will reduce contaminant concentrations to levels that are consistent with Applicable or Relevant and Appropriate Requirements and To Be Considered criteria.

The net present worth cost of the original remedy is estimated at $11,825,000. The net present worth cost of the amended remedy is estimated at $6,267,000. Given the amended remedy is as protective of human health and the environment as the original remedy, and it provides the best overall effectiveness in a significantly shorter period of time, the selected remedy is, therefore, cost-effective.

State Concurrence

The Department, in reviewing the AROD, has determined that the selected remedy is consistent with the Department's requirements for a remedial action plan and meets all of the criteria for remedial action plan approval. The selected remedy establishes a remedial action that, as proposed, will treat the contamination source to prevent the additional release of contaminants to groundwater, surface water and soil and manages the health hazard associated with direct exposure to the contaminant source. The selected remedy will also contain contaminated groundwater within the limits of a Groundwater Management Zone and restore groundwater quality to meet the State's Ambient Groundwater Quality Standards.

Ultimately, the proposed remedial action will provide protection of human health and the environment. Therefore, the Department, acting on behalf of the State of New Hampshire, concurs with the selected remedy, as described in the Amended ROD.

In striving to maximize the effectiveness of limited public and private resources, the Department continues to seek reasonable and practical solutions to the complex challenges associated with contaminated site cleanups. The partnership and dedication of EPA and the Department will speed up the achievement of our mutual environmental goals at this Site. As always, the Department stands ready to provide the guidance and assistance that EPA may require to take the actions necessary to fully protect human health and the environment in a cost-effective manner.

Sincerely,

Michael J. Wimsatt, P.G.
Director
Waste Management Division

cc: Charles Hart, Selectmen Chair, Town of Kingston
Jim Brown, USEPA
Richard Head, Esq., NHDOJ
Frederick J. McGarry, P.E., DEE, NHDES
Carl W. Baxter, P.E., NHDES
Richard Pease, P.E., NHDES
Andrew Hoffman, P.E., NHDES

APPENDIX D

RESPONSIVENESS SUMMARY

Excerpt of Transcript from August 23, 1007 Public Hearing prepared by Maryellen Coughlin: Comments and Questions from the Public and Draft Responses for EPA Review

Commenters were:

Richard St. Hilaire
David Joy
Brian Quinlan

Courier Font is text directly from the transcript. Arial font is text added by M&E.

Comment 1: Richard St. Hilaire

MR. ST. HILARIE: Richard St. Hilarie, S-T. H-I-L-A-R-I-E. I'm a road agent in the Town of Kingston. I've been involved with this site since we found it on the fire department sometime around 1978. I've been watching this progress. I'm very happy with the progress that's been made, although I wish it had been done at a faster pace, understanding that money is always an issue.

I think this new plan, this in-situ plan is probably a good thing, and I hope EPA decides to go forward with it. The reason why I think it's a good plan is we should have an answer within five years of whether this has worked or not versus the old pump and treat which could be 30, 40, 50 years before things are cleaned up.

So basically I think this is a good thing, and I hope we go forward with it to get the thing cleaned up finally to the levels that it should be cleaned up to.

EPA Response: EPA appreciates the support for the Proposed Plan and agrees that one of the main benefits we hope to achieve by the changed remedy is a quicker cleanup.

Comment 2: David Joy

MR. JOY: My name is David Joy, I live in Kingston. I probably live within a half a mile of that site, and my only comment would be that, like most citizens, I'm concerned with our good quality of water which exists here in town. We do have very nice water. And you fellas look like you have a good plan. I'm sure you've put a lot of thought into this.

And all I can say is, as you go forward, just keep the very best interests of the residents who live as close as I do, but also within the area, at heart so that whatever you do effects a good cleanup and that the water remains safe and good quality to drink now and for many, many years in the future.

EPA Response: EPA appreciates the concern with water quality and the support for the Proposed Plan. EPA is proposing this change in the remedy with the goal of restoring

groundwater quality throughout the site more quickly and cost-effectively than EPA feels can be done using the pump and treat technology. EPA will monitor the groundwater quality during remedy implementation (when oxidants will be injected into the ground) carefully, to ensure that there is no impact on groundwater quality beyond the borders of the Groundwater Management Zone (GMZ) that will be established (see Figure 4 in the ROD Amendment). The GMZ is needed to prevent the installation of wells in contaminated areas, so that people are protected from possible exposure to contaminated groundwater until cleanup goals are met. To date no residential wells have been impacted by the site plume, and the State has been monitoring the residential wells closest to the plume since 1992. Therefore, the GMZ does not need to encompass currently existing wells. The GMZ will stay in effect until cleanup goals are attained throughout the whole contaminated groundwater plume.

Comment 3a: Brian Quinlan

MR. QUINLAN: My name is Brian Quinlan, Q-U-I-N-L-A-N. I'm the chairman of the Kingston Conservation Commission, and like Rich said, I am quite for this change in the Record of Decision. I think that trying a remedial strategy that's going to hopefully clean up the site in five years as opposed to 30 years is definitely the way to go. And as a matter of fact, after you did the soil cleanup on the Ottati & Goss site and then the subsequent cleanup on the wetlands site, I was wondering if you were indeed thinking about changing your remedial strategy, thinking in mind that, you know, once the source areas were cleaned up that you would probably start seeing some reduction in groundwater concentrations out there, and that's perhaps what your thought process was.

EPA Response: The commenter is correct that it was part of EPA's thought process that it would be prudent to monitor for a few years to see what would happen to the groundwater concentrations after the major source areas were cleaned up in 2002, instead of proceeding immediately to design and construct the pump and treat remedy.

Comment 3b: Brian Quinlan

And I do have a couple of questions. I don't know if this is the time to answer questions. I can't remember if these were actually addressed during the last meeting.

But one of them is that those two areas up there where you have the one part per million, one of them actually appears to be right under Route 125, and I was wondering how you were going to address that with your injections.

EPA Response: EPA is also concerned with the possibility that there may be contaminated soil as well as contaminated groundwater under Route 125. During the 2002 source removal work, contaminated soil was excavated as close to Route 125 as could be safely done without undermining the road. Some residual soil contamination remains along the edge of the road and may possibly be under it. For the ISCO remedy, EPA intends to design the remedy so that oxidant is injected into the ground as close to the western edge of Route 125 as possible. Oxidant will migrate under the road with the flow of groundwater from west to east, and therefore there should be some destruction of contamination under the road, before the oxidant is fully used up. The estimated lifetime of the oxidant in groundwater is a few weeks to a few months, depending on the type of oxidant that is used, so the distance the oxidant will migrate is limited before it is totally consumed. Therefore, EPA may also consider the possibility of performing angled drilling under the road so that oxidant can be injected under it. However, EPA is

concerned that injecting liquids under the road could affect the stability of the road. The New Hampshire Department of Transportation would need to be consulted and may have similar concerns, and recommend that injection under the road not be attempted.

The overall concept of the ISCO remedy is that direct treatment will focus on hot spots west of Route 125, and that the extended plume (the contaminated groundwater that has migrated beyond the hot spot areas) will eventually decline once the hot spots are treated. If there is a significant hot spot under Route 125 that cannot be accessed without potential damage to the road, it may take longer for the extended plume to reach cleanup goals.

Comment 3c: Brian Quinlan

And another question I had was, you know, do you have any idea why there are still those supposed two hot spots out there, and do you have a good handle on whether or not all the soil above the water table has been cleaned up to concentrations that aren't still contributing to the groundwater contamination in those areas.

EPA Response: There are some areas of soil contamination that could not be removed and treated in 2002, either because the soil was below the water table and too wet to be treated by the on-site treatment system, or because the soil was too close to Route 125 to be removed without possibly undermining the road. An estimated 19,000 cubic yards of soil above the water table that exceeded EPA's soil cleanup goals was removed and treated. Samples were collected after excavation that show where soil had to be left in place that exceeded EPA's soil cleanup goals. EPA believes that these areas are contributing to the groundwater plume "hot spots". The hot spot near the center of the portion of the site west of Route 125 (the center of Area A on Figure 3 of the Amended ROD) is in the area where there used to be two unlined waste lagoons called the Kingston Swamp and the Caustic Lagoon (closed in 1973-1974). The Caustic Lagoon was used to hold caustic rinse water from drum cleaning, and before closure in 1974 reportedly contained a 1.5-foot thick layer of floating oil. Buried drums were also found in this area during the 1986 Remedial Investigation. This area has historically had high groundwater contaminant concentrations. Another area where groundwater contamination remains high is the area identified as Area B, in the southeast corner of the part of the site west of Route 125 (see Figure 3). Discharges from the former building may have drained to a dry well in this area. Also, the soil in this area is very tight – groundwater moves through it very slowly and it is very difficult to draw much water from wells installed in this area. EPA suspects that contamination may be "stuck" in this area because of the very low permeability of the soil. Finally, because this area is right next to Route 125, excavation had to be halted in some cases to avoid undermining the road.

Comment 3d: Brian Quinlan

And also, that north plume, I was wondering, when was that identified, how long ago was that identified, and do you have any ideas on what might be contributing to that?

EPA Response: Low levels of groundwater contamination with VOCs have been detected in well B-5A to the north of the fence since 1984. In 2005 the total VOC concentration in this well was 48 ppb. Test pits were dug in the area west of B-5A during the 1986 RI, because this area was formerly used for drum storage and it was thought a release may have occurred there. Soil samples were collected from the test pits. No drums were encountered and no VOCs were detected. An additional test pit investigation was performed near B-5A in 2000 to attempt to identify the source of the groundwater contamination there, with similar results. After the second test pit investigation, EPA concluded that additional effort to attempt to identify a source was not necessary, because the pump and treat remedy was expected to be designed to capture

groundwater from the B-5A area as well as the main plume area.

In 2004, the first round of groundwater monitoring that included analysis for 1,4-dioxane by a specialized method (as well as VOCs by routine methods) was performed, and it was discovered that there is a northern plume that consists primarily of 1,4-dioxane that includes B-5A, but is more concentrated in the vicinity of B-4A located approximately 480 feet to the southeast of B-5A. Until the 1,4-dioxane was detected, it was thought that northern groundwater contamination plume was more limited in size and centered around B-5A. EPA acknowledges that the current illustration of the North Plume (Figure 3) is based on very few data points, and additional investigation is planned for 2008 to attempt to understand the contamination in this area with the same degree of detail as it is known for Areas A and B.

So I guess that's it. Those are my comments and questions, if you want to answer those questions now or how you want to address them.

APPENDIX E

ADMINISTRATIVE RECORD INDEX

Ottati & Goss
NPL Site Administrative Record File
Record of Decision (ROD) Proposed Plan

Index

Proposed Plan Dated July 2007
Released July 2007

Prepared by
EPA New England
Office of Site Remediation & Restoration

Introduction to the Collection

This is the administrative record file for the Ottati & Goss Superfund Site, Kingston, NH, Record of Decision (ROD) Proposed Plan, released July, 2007. The file contains site-specific documents and a list of guidance documents used by EPA staff in selecting a response action at the site.

This file includes, by reference, the administrative record file for the Ottati & Goss Removal Action issued December 19, 1980, ROD issued January 16, 1987, DeMinimis Settlement issued May 1, 1995, ESD issued September 29, 1999, and ESD issued February 7, 2002.

The administrative record file is available for review at:

EPA New England Office of
Site Remediation & Restoration
(OSRR) Records and Information Center
1 Congress Street, Suite 1100 (HSC)
Boston, MA 02114
(by appointment)
617-918-1440 (phone)
617-918-1223 (fax)
www.epa.gov/region01/superfund/resource/records.htm

Kingston Town Hall
Main Street
Kingston, NH 03848
(603) 642-3112 (phone)
www.kingstonnh.org

Questions about this administrative record file should be directed to the EPA New England site manager.

An administrative record file is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

04: FEASIBILITY STUDY (FS)

274200 **DRAFT TASK ORDER PROPOSAL AND COST ESTIMATE FOR FEASIBILITY STUDY (FS) SUPPORT**

Author: METCALF & EDDY INC
Addressee:
Doc Type: WORK PLAN

Doc Date: 03/01/2007 **# of Pages:** 14
File Break: 04.07

266333 **EPA APPROVAL OF DRAFT TASK ORDER PROPOSAL AND COST ESTIMATE FOR FEASIBILITY STUDY (FS) SUPPORT, FEASIBILITY STUDY (FS) START (STATEMENT OF WORK IS ATTACHED)**

Author: US EPA REGION 1
Addressee:
Doc Type: CONTRACT DOCUMENTATION
Doc Type: RI, FS, RI/FS START

Doc Date: 03/12/2007 **# of Pages:** 5
File Break: 04.07

263793 **FINAL PROPOSED PLAN**

Author: EPA REGION 1
Addressee:
Doc Type: PROPOSED PLAN
Doc Type: MISC
Doc Type: ADMIN RECORD (AR) INDEX

Doc Date: 07/01/2007 **# of Pages:** 18
File Break: 04.09

04: FEASIBILITY STUDY (FS)

263795 **FEASIBILITY STUDY ADDENDUM REPORT, OTTATI AND GOSS, KINGSTON, NEW HAMPSHIRE**

Author: EPA REGION 1
Addressee: METCALF & EDDY INC
EPA REGION 1

Doc Date: 07/01/2007 **# of Pages:** 200
File Break: 04.04
04.06

Doc Type: FEASIBILITY STUDY (FS)

263796 **MEMORANDUM REGARDING MODELING EFFORTS AND ESTIMATED CLEANUP TIME FOR PUMP AND TREAT ALTERNATIVE**

Author: BILL ABRAHAMS-DEMATTE METCALF & EDDY
Addressee: BARBARA A WEIR METCALF AND EDDY INC
JIM BROWN US EPA REGION 1

Doc Date: 07/23/2007 **# of Pages:** 92
File Break: 04.04

Doc Type: ADMIN RECORD (AR) INDEX
Doc Type: MEMO

05: RECORD OF DECISION (ROD)

3438 **RECORD OF DECISION (ROD)**

Author: US EPA REGION 1
Addressee:

Doc Date: 01/16/1987 **# of Pages:** 193
File Break: 05.04

Doc Type: REPORT

06: REMEDIAL DESIGN (RD)

263765 **SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN) FOR REMEDIAL DESIGN REVISION 01 VOLUME 1 OF 2**

Author: METCALF & EDDY
Addressee: EPA REGION 1
Doc Date: 11/01/2004 **# of Pages:** 326
File Break: 06.02
Doc Type: REPORT

263769 **SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN) FOR REMEDIAL DESIGN VOLUME 2 OF 2**

Author: METCALF & EDDY
Addressee: EPA REGION 1
Doc Date: 11/01/2004 **# of Pages:** 549
File Break: 06.02
Doc Type: REPORT

263773 **DRAFT, TREATABILITY REPORT**

Author: METCALF & EDDY
Addressee: EPA REGION 1
Doc Date: 02/01/2005 **# of Pages:** 163
File Break: 06.04
Doc Type: MISC

263767 **GROUNDWATER MONITORING REPORT FOR THE MARCH 2004 AND JUNE 2004 EVENTS**

Author: METCALF & EDDY
Addressee: EPA REGION 1
Doc Date: 03/01/2005 **# of Pages:** 538
File Break: 06.04
Doc Type: GW MONITORING (POST ROD)
Doc Type: REPORT

06: REMEDIAL DESIGN (RD)

263772 **DRAFT, PUMPING TEST AND CAPTURE ZONE ANALYSIS REPORT**

Author: METCALF & EDDY
Addressee: EPA REGION 1
Doc Date: 03/01/2005 **# of Pages:** 3374
File Break: 06.04
Doc Type: MISC
Doc Type: REPORT

263764 **SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN) FOR REMEDIAL DESIGN SAP ADDENDUM TO REVISION 01**

Author: METCALF & EDDY
Addressee: EPA REGION 1
Doc Date: 12/01/2005 **# of Pages:** 128
File Break: 06.02
Doc Type: REPORT

263766 **TECHNICAL MEMORANDUM FOR DECEMBER 2005 GROUNDWATER MONITORING EVENT**

Author: METCALF & EDDY
Addressee: EPA REGION 1
Doc Date: 05/01/2006 **# of Pages:** 139
File Break: 06.04
Doc Type: MEMO

273598 **DRAFT TASK ORDER PROPOSAL FOR REMEDIAL DESIGN (RD)**

Author: METCALF & EDDY INC
Addressee:
Doc Date: 11/01/2006 **# of Pages:** 24
File Break: 06.06
Doc Type: WORK PLAN

06: REMEDIAL DESIGN (RD)

273599 **EPA APPROVAL OF DRAFT TASK ORDER PROPOSAL FOR REMEDIAL DESIGN (RD) (REVISED STATEMENT OF WORK FOR REMEDIAL DESIGN (RD) ATTACHED)**

Author: US EPA REGION 1
Addressee:
Doc Type: CONTRACT DOCUMENTATION

Doc Date: 01/25/2007 **# of Pages:** 10
File Break: 06.06

08: POST REMEDIAL ACTION

269685 **NOTICE OF ACTIVITY AND USE RESTRICTION**

Author: MICHAEL J WALLS NH DEPT OF ENVIRONMENTAL SERVICES
Addressee:
Doc Type: INSTITUTIONAL CONTROL(S)
Doc Type: CONTRACT DOCUMENTATION

Doc Date: 10/06/2006 **# of Pages:** 10
File Break: 08.07

Number of Documents in Collection: 16

EPA Region 1 AR Compendium GUIDANCE DOCUMENTS

EPA guidance documents may be reviewed at the EPA Region I Superfund Records Center in Boston, Massachusetts.

TITLE
INTERIM FINAL GUIDANCE FOR CONDUCTING REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES UNDER CERCLA. DUPLICATE OF 2002.

DOCDATE	OSWER/EPA ID	DOCNUMBER
10/1/1988	OSWER 9355.3-01	C170

TITLE
A GUIDE TO DEVELOPING AND DOCUMENTING COST ESTIMATES DURING THE FEASIBILITY STUDY

DOCDATE	OSWER/EPA ID	DOCNUMBER
7/1/2000	OSWER 9355.0-75	C582

TITLE
IN-SITU CHEMICAL OXIDATION

DOCDATE	OSWER/EPA ID	DOCNUMBER
		C649

TITLE
EPA NATIONAL PRIMARY DRINKING WATER STANDARDS

DOCDATE	OSWER/EPA ID	DOCNUMBER
6/1/2003		C650